The logo consists of a cluster of circles in various sizes and colors (blue, green, white) arranged in a roughly circular pattern on the left side of the page. The text is positioned to the right of this graphic.

**WORLD
CONGRESS
ON PARTICLE
TECHNOLOGY**

**Expanding Boundaries
2018**

APRIL 22-26, 2018

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WELCOME ADDRESS



On behalf of the organizing committee, I would like to welcome you to the 8th World Congress on Particle Technology (WCPT VIII) in Orlando, Florida from April 22nd through 26th, 2018. The first World Congress on Particle Technology was in 1986 in Nuremberg, Germany with Kurt Leschonski as chair. Since then it has grown in scale and coverage. The WCPT is currently held every four years all over the world from Nuremberg to Kyoto, Brighton, Sydney, Orlando, Nuremberg, Beijing and to now back in Orlando. For this conference, we have amassed over 100 poster presentations, 630 oral presentations, five plenary speakers, 29 keynote speakers covering 14 different topics in Particle Technology.

Our theme for this congress is **Expanding Boundaries**. It may sound like a cliché, but it's really not. This conference focus is intended to expand boundaries regarding the topics, training, and even the meeting format. Your topical areas span all aspects of particle technology with additional considerations for pharmaceuticals, environmental impact, sustainable energy, and safety. Furthermore, topical areas range from fundamental research in particle design, classification, interactions, and hydrodynamics to industrial applications in granular flow systems, separations, conveying and reaction processes.

We have also put an emphasis on training as training in its very nature is expanding boundaries. Several sessions focus on new methods, technology and processes, plus one area is focused on safety. In addition, we have added two training workshops in the modeling of particle systems as applied to industrial applications and scale up. One session is on general principles with a subsequent session directed at particle drag with the possibility of particle clusters using the EMMS methodology.

Finally, we have changed the meeting functionality itself. Most topical areas are kicked off with keynote speakers; meeting durations are dependent on topic area. Realizing some topics can be covered in a 15-minute presentation whereas others may require more time, topical areas now have varying presentations times. Moving from topic to topic will be more challenging; but, each topic area can now present their material in a time frame that best supports their needs.

We have also added break out areas and discussion space with the goal of stimulating discussion or just having a place to collect your thoughts from a recent presentation. Also, poster sessions are now at the forefront of the conference. One poster session will highlight student research with competitive "best poster" awards while the other will provide a venue for those last minute revelation that have missed conference call for abstract deadline.

With all of this, we hope to stimulate discussion on where particle technology has been but also where it needs to go. We have a world of problems, and we all need to expand our boundaries to solve them, together.

Yours truly,

A handwritten signature in black ink, appearing to read "Raymond Cocco".

Dr. Ray Cocco

Particulate Solid Research, Inc. (PSRI)

Chairman of WCPT VIII

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8TH WORLD CONGRESS ON PARTICLE TECHNOLOGY ORGANIZING COMMITTEE

8th World Congress on Particle Technology Chair

Ray Cocco

Particulate Solid Research, Inc. (PSRI)

Conference Chair

Advisory Board

Alissa Park, *Columbia University*

Benjamin Amblard, *IFPEN*

Tim Bell, *DowDuPont*

Ron Breault, *National Energy Technology Laboratory*

David Craig, *Jenike & Johanson, Inc.*

Rajesh Davé, *New Jersey Institute of Technology*

Shrikant Dhodapkar, *The Dow Chemical Company*

Thierry Gauthier, *IFPEN*

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Mayank Kashyap, *SABIC*

George Klinzing, *University of Pittsburgh*

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Raffaella Ocone, *Heriot-Watt University*

Eric Shen, *ExxonMobil*

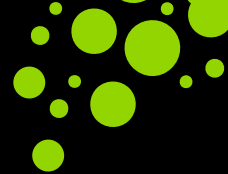
Al Weimer, *University of Colorado at Boulder*

AICHE Staff Support

Ilia Killeen, *Meeting Logistics*

Stéphanie Orvoine-Couvrette, *Program Development*





Particle & Bulk Powder Characterization

Ben Freireich, *Particulate Solid Research, Inc. (PSRI)*

Álvaro Ramírez Gómez, *Universidad Politécnica de Madrid*

Particle Interactions

Stefan Heinrich, *TU Hamburg*

Shuji Matsusaka, *University of Kyoto*

Particle Design

Mark Jones, *University of Newcastle*

Yongsheng Han, *Chinese Academy of Sciences*

Handling & Processing of Granular Systems

David Craig, *Jenike & Johanson*

Shrikant Dhodapkar, *The Dow Chemical Company*

Particle & Nanoparticle Functionalization

Al Weimer, *University of Colorado, Boulder*

Youngjune Park, *Gwangju Institute of Science & Technology*

Particle Classification

Junwu Wang, *Chinese Academy of Sciences*

Benjamin Amblard, *IFPEN*

Fluidization & Multiphase Flow

Reddy Karri, *Particulate Solid Research, Inc. (PSRI)*

Tony Bi, *University of British Columbia*

Applications with Sustainable Energy & Environment

Eric Shen, *ExxonMobil*

Alissa Park, *Columbia University*

Particle-Based Separations: Fundamentals & Applications

Fanxing Li, *North Carolina State University*

Allan Issangya, *Particulate Solid Research, Inc. (PSRI)*

Applications of Particle Technology for Pharmaceuticals

Brenda Remy, *Bristol-Myers Squibb*

Chi-Hwa Wang, *National University of Singapore*

Applications of Solids Processing Unit Operations

Haim Kalman, *Ben Gurion University*

Bruce Hook, *The Dow Chemical Company*

Special Topics in Particle Technology

Madhusudhan Kodam, *The Dow Chemical Company*

Paola Lettieri, *University College London*

Education

Mayank Kashyap, *SABIC*

George Klinzing, *University of Pittsburgh*

Combustible Dust Safety

Konanur Manjunath, *The Dow Chemical Company*

2018 MEETING REGULATIONS + SAFETY



A NOTE ON PHOTOGRAPHY AND VIDEOGRAPHY FROM THE MEETING ORGANIZERS

AIChE Meetings are one of the primary ways the Institute fulfills its mission to advance the development and exchange of relevant knowledge.

The content presented at the AIChE Annual Meeting is the property of the presenters and the firms where they work.

Recording of sessions or taking photos of slides is strictly prohibited.

Thank you.



SAFETY TIPS

Enhance your experience at the AIChE Meeting by staying safe. Here are some safety tips to observe:



- When off the hotel grounds, please do not wear your badge in public. Doing so can give professional opportunists access to your name, which they may then exploit to your detriment.
- When you are through with your badge, turn it in to registration. Do not leave it laying in the open so that unscrupulous individuals have access to it. In addition, please do not let anyone have access to your badge for any purpose. Lending badges to others for access to the meeting is strictly prohibited.
- Have your room key out and ready when entering your hotel room. Fumbling in an attempt to locate it in either a pocket or purse outside your door could be a security risk.
- Never give a stranger your room number.
- Upon check-in to your room, note where the nearest fire exits are, so you know in which direction to go quickly in case of a fire emergency. Remember – smoke rises, so if necessary, while exiting, get as close to the floor as possible when there is heavy smoke present.
- When out in an urban area, it is advisable to travel in groups or pairs.
- Looking down and concentrating on a mobile device while texting or listening to music through earbuds can be a hazardous activity. Doing so while you are attempting to cross a street, get on or off an escalator, walk in a crowd, or make your way through an exhibit area can all be harmful to your safety and the safety of others.
Recently, there have been many incidents of distracted meeting attendees who have attempted to walk up the down escalators or walk down the up escalators in our meeting venues.
Please take advantage of the ample seating provided in our meeting facilities in order to use your mobile device(s) in a calm setting, so that you have a safe, enjoyable experience at AIChE meetings.
- Avoid excessive consumption of alcohol. Alcohol reduces inhibitions and impairs the capacity to reason – a perfect formula to make you a target for unscrupulous behavior.

This security advisory was implemented by AIChE's Executive Board of the Program Committee (EBPC) with your safety in mind. We welcome any other suggestions you may have to help attendees have a safe and pleasant experience at our meetings.



Particulate Solid Research, Inc.



Solutions

PSRI has been solving problems in granular-fluid operations for clients all over the world using 200 years of cumulative experience coupled with our state-of-the-art research capabilities. PSRI get the solution before problems get expensive.



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PSRI has been helping industries in a wide and diverse range of technologies ranging from basic and speciality chemicals, petrochemicals, energy, mining, polyolefins, pharmaceuticals, and environmental systems. Our consultants are globally recognized, each with at least 20 years of industrial experience. Chances are, we have already seen your problem.



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We don't stop at solution space. We believe that training is an essential part of maintaining success. Thus, PSRI offers intensive fluidization seminars all over the world, provides design manuals, procedures, methods, and webinars.



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PSRI has state-of-the-art facilities for research on an industrial scale. We have a wide range of research equipment including:

- Risers up to 36-in (0.9-m) dia. by 90-ft (27.4-m) tall,
- Fluidized beds up to 84-in (2-m) dia. by 22-ft (6.7-m) tall,
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- Conveying lines, feeders, hoppers, etc.

As a result, PSRI's research is relevant to your problems and your bottom line.

Applying the Fundamentals

<http://psri.org>

Want to Learn More, Please Visit Us at Booth 200

ONSITE INFORMATION



8th World Congress on Particle Technology Registration

Cypress Ballroom 1/2, Orlando World Center Marriott

Sunday, April 22	12:00 PM – 7:30 PM
Monday, April 23	7:00 AM – 5:30 PM
Tuesday, April 24	7:30 AM – 5:00 PM
Wednesday, April 25	7:30 AM – 5:00 PM
Thursday, April 26*	8:00 AM – 12:00 PM

* Registration on Thursday, April 26 will be outside of the Crystal Ballroom, Orlando World Center Marriott.

Put the Meeting on Your Phone or Tablet.



Download the AICHEvents App to get access to everything you need to have a better meeting.

**SEARCH. SCOPE OUT. PREVIEW. LEARN MORE. FIND.
PLAN, STORE AND UPDATE YOUR SCHEDULE.**

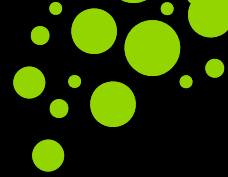
See the past, present and upcoming events all in one place. Whether you carry an Android or iOS device, the AICHEvents app delivers the same native functionality.

Blackberry and other smartphone users can access the WCPT8 content via the new online planner available on www.wcpt8.org.

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8th World Congress on Particle Technology Exhibit

Crystal Ballroom H, Orlando World Center Marriott

Monday, April 23	9:00 AM – 4:00 PM
Tuesday, April 24	9:00 AM – 4:00 PM
Wednesday, April 25	9:00 AM – 4:00 PM



8th World Congress on Particle Technology Coffee Breaks

Crystal Ballroom H, Orlando World Center Marriott

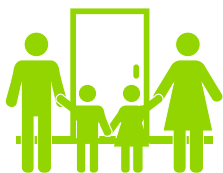
Monday, April 23	9:30 AM – 10:00 AM	3:00 PM – 3:30 PM
Tuesday, April 24	9:45 AM – 10:30 AM	3:00 PM – 3:30 PM
Wednesday, April 25	9:45 AM – 10:30 AM	3:00 PM – 3:30 PM
Thursday, April 26	9:45 AM – 10:30 AM	



Lunch Vendor / Station

Cypress Ballroom 1/2, Orlando World Center Marriott

Monday, April 23	11:00 AM – 2:00 PM
Tuesday, April 24	11:00 AM – 2:00 PM



WIC Family Accommodations Room

Palms Office, Orlando World Center Marriott

Sunday, April 22 - Thursday, April 26

2018 MEETING EXHIBITORS

As of March 16, 2018

Exhibitor	Booth #
Anton Parr	108
Coupi, Inc.	211
CPFD*	101
Fluid Imaging Technologies	210
Formulation	213
Freeman Technology	106
Fritsch Milling & Sizing, Inc.	112
Heumann Environmental Company	103
IFPRI	100
LUM	201
Malvern PANalytical	102

* Company is recruiting.

Exhibitor	Booth #
National Energy Technology Laboratory	111
Oxford Lasers	104
Particle Sizing Systems, LLC	205
Particle Technology Labs	203
Particulate Solid Research, Inc. (PSRI)	200
Process Systems Enterprise (PSE)	202
Quantachrome	110
Rocky DEM	204
Siemens PLM Software	105
Sympatec Inc	209
Tech4Imaging	207

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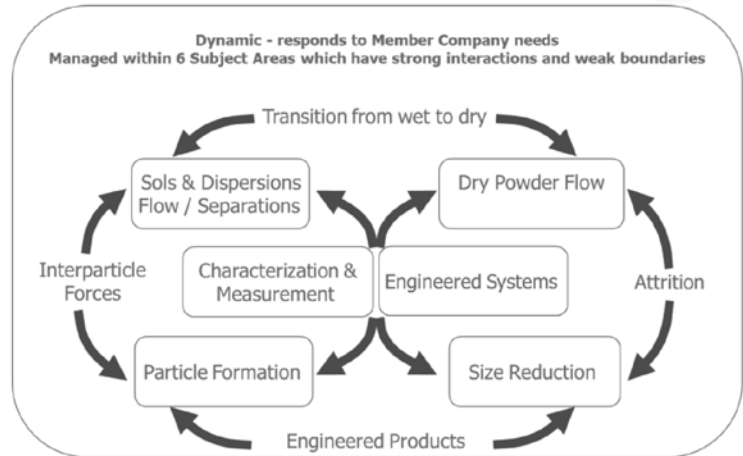
International Fine Particle Research Institute

The International Fine Particle Research Institute, (IFPRI), is a unique global network of companies, active in almost all industrial areas, and academics with active research programs in particle science and technology. IFPRI is a non-profit organization.

IFPRI's membership represents some of the world's largest manufacturing industries: bulk and specialty chemicals, pharmaceuticals, minerals, constructions, coatings, detergents and foods. The industry members work alongside some of the finest academic researchers in the world in particle science and technology, and other allied areas.

Mission:

- Provide venue for particle technology discussion
- Develop pre-competitive strategic plan for particle science
- R&D focus on industry concerns



Visit Booth #100

Type	Research Area	Project Title	Research Associate	Institution	
Full Project	Characterization	Die Filling of Aerated Powders	C. Wu	U. Surrey	
	Size Reduction	Development of Grindability tests	J. Ooi	U. Edinburgh	
	Formation		Molecular Self Assembly	U. Wiesner	Cornell U.
			Crystal Shape Prediction	M. Donerty	UCSB
			Creating Tuneable Agglomerates via 3D Printing	K. Haggood	Monash U.
	Dry Systems		Relating Compaction Performance and Behavior to Process Conditions	A. Zavaliangos	Drexel U.
			Spray Drying at High Temperatures	A. Bayli	U. Leeds
			Flowability Assessment of Weakly Consolidated Powders	C. Hare	U. Surrey
			Prediction of Segregation	J. McCarthy	U. Pittsburgh
	Wet Systems		Dry Powder Rheology	K. Daniels	NC State U.
			Scaling Rules for Powder Mixing	I. Govender	U. KwaZulu-Zulu
			On the Long-Term Stability of Colloidal Gels	W. Poon	U. Edinburgh
Systems Engineering		Deliquoring of Solvent Wetted Cakes	U. Peuker	TU Freiberg	
		Model-Based Control of Crystallization	Z. Nagy	Purdue U.	
Collaborations	Dry Systems	Non-Local Rheology of Intermediate Granular Flows	Daniels and Friend		
		Experimental Validation of Segregation	McCarthy and Hill		
Reviews	Wet Systems	Methods (Experimental and Numerical) for Describing Wall Boundary Layers in High Shear Systems (Extruders)	R. Bonnecaze	U. Texas	
		Grinding	Use of Grinding Aids in Dry Systems Relative Humidity and the Flowability of Hydroscopic Powders and Granules	A. Kwade	TU Braunschweig
Workshop	Wet Systems	Suspension Slurries – Insights from New Physics	June 22 and 23, 2018	U. Edinburgh	
Roundtable	Dry Systems	Round Robin Exercise on Calibration of DEM Simulations	TBD	TBD	
Project Briefs for 2018 Programs (Proposed Programs)	Formation	Effect of Material Properties on the Adherence of Powders to Metal Processing Equipment During Compaction	TBD	TBD	
		Characterization of Spray Drying Nozzles at Industrial Relevant Conditions	TBD	TBD	
	Dry Systems	Flow at Boundaries – Spreading in Thin and Uniform Layers	TBD	TBD	
		Investigation of Particle Characteristics on High Solids Rheology	TBD	TBD	
Wet Systems	Wetting, Dispersion, Distribution of Powders and Packed Beds: Reconstitution of Organic/Biological Materials	TBD	TBD		
	Grinding	Predicting and Characterizing of Surface Modifications During Milling	TBD	TBD	

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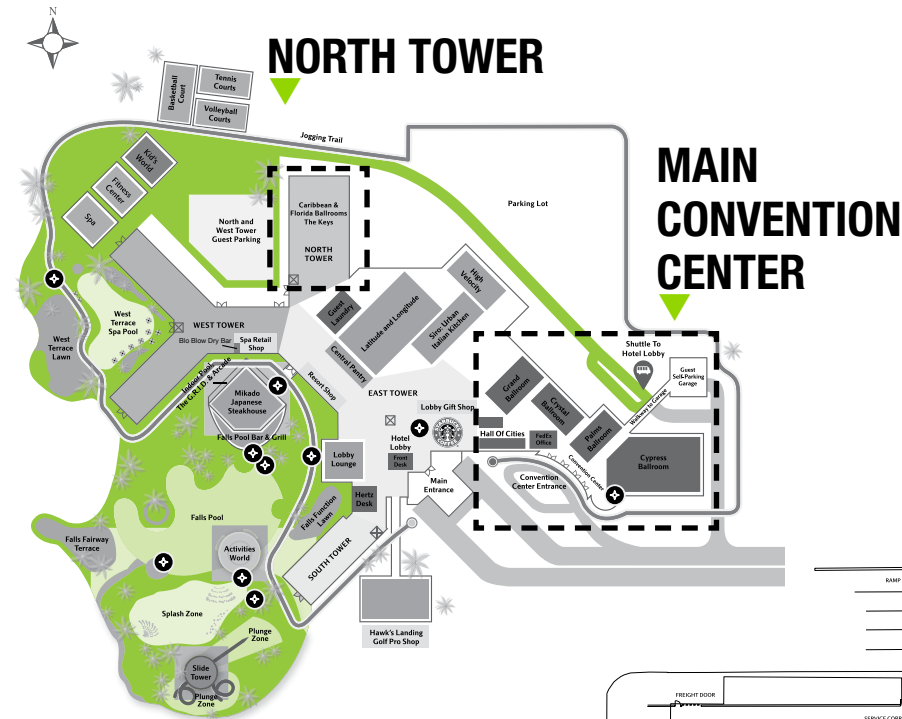
- DCS Computing
- Freeman Technology
- Granutools
- Horiba
- Hosokawa
- Particle Analytics
- Paul O. Abbe
- PSE

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Join our next Annual General Meeting June 24-28, 2018 in Edinburgh, Scotland.

Contact Willie Hendrickson at whendrickson@aveka.com

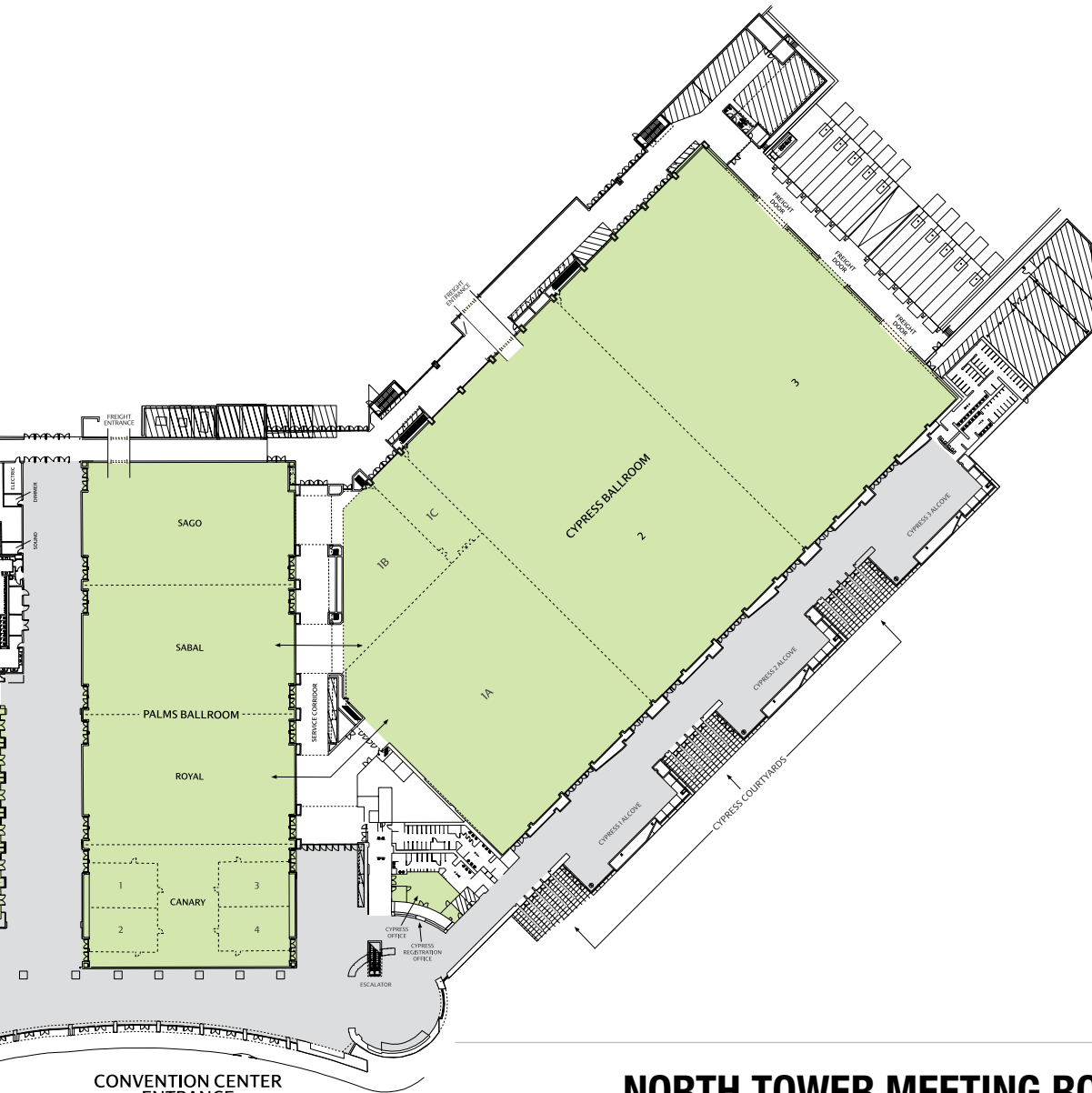
MARRIOTT ORLANDO WORLD CENTER



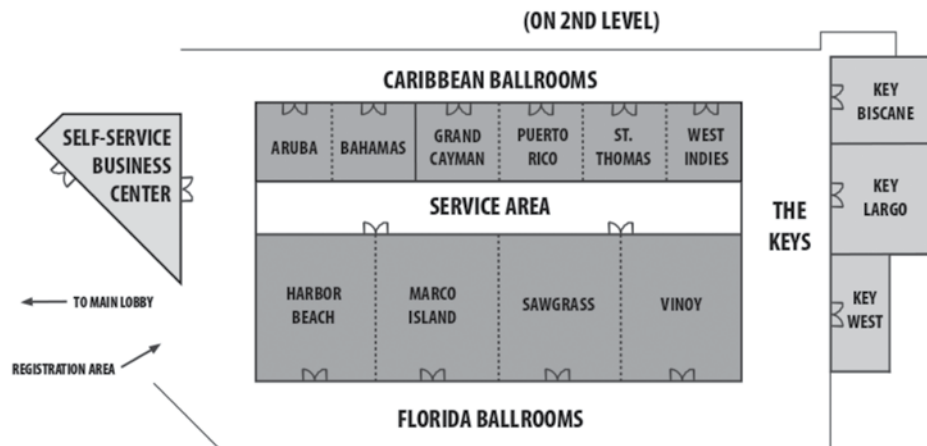
PROPERTY MAP ▲



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NORTH TOWER MEETING ROOMS ▼



8TH WORLD CONGRESS ON PARTICLE TECHNOLOGY CONFERENCE **SCHEDULE**

Property Key ► Marriott = Orlando World Center Marriott ► Crystal = Crystal Ballroom

Sunday, April 22

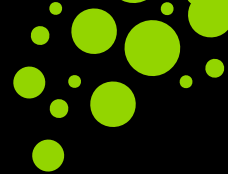
9:00 AM - 5:00 PM

Crystal A	Computational Fluid Dynamics (CFD) Workshop on Particle Technology (Ticketed Event)
Cypress 1/2	Registration

Monday, April 23

	8:00 - 9:30 AM	9:30 - 10:00 AM	10:00 - 11:00 AM	11:00 - 12:00 PM	12:00 - 1:15 PM	1:30 - 3:00 PM	3:00 - 3:30 PM	3:30 - 5:00 PM
Crystal A	Sessions					Sessions		Sessions
Crystal B								
Crystal C								
Crystal D								
Crystal E								
Crystal F								
Crystal G			Plenary: Contact Charging in Granular Materials Heinrich Jaeger, <i>University of Chicago</i>	Plenary: Mesoscience - Opening a New Paradigm of Particle Technology Jinghai Li, <i>Chinese Academy of Sciences</i>				
Crystal H	Exhibit Setup	Coffee Break	Exhibits & Lounge	Exhibits & Lounge	Lunch Break	Exhibit & Lounge	Coffee Break	Exhibits & Lounge
Crystal J1	Sessions					Sessions		Sessions
Crystal J2								
Crystal K								
Crystal L								
Crystal M								
Crystal N								
Crystal P								
Crystal Q								
Cypress 1/2	Registration							

8TH WORLD CONGRESS ON PARTICLE TECHNOLOGY CONFERENCE **SCHEDULE**

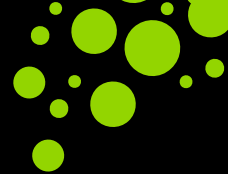


Tuesday, April 24								
	8:15 - 9:45 AM	9:45 - 10:30 AM	10:30 - 11:30 AM	11:45 - 1:15 PM	1:30 - 3:00 PM	3:00 - 3:30 PM	3:30 - 5:00 PM	
Crystal A	Sessions				Sessions			Sessions
Crystal B								
Crystal C								
Crystal D								
Crystal E								
Crystal F								
Crystal G			Plenary: Nature-Inspired Chemical Engineering - a Pathway to Innovation in Particle Technology Marc-Olivier Coppens, <i>University College London</i>					
Crystal H	Exhibits & Lounge	Coffee Break	Exhibits & Lounge	World Congress on Particle Technology Poster Session	Exhibits & Lounge	Coffee Break	Exhibits & Lounge	
Crystal J1	Sessions				Sessions			Sessions
Crystal J2								
Crystal K								
Crystal L								
Crystal M								
Crystal N								
Crystal P								
Crystal Q	EMMS Workshop (Ticketed Event)							
Cypress 1/2	Registration							

8TH WORLD CONGRESS ON PARTICLE TECHNOLOGY
CONFERENCE SCHEDULE

Wednesday, April 25									
	8:15 - 9:45 AM	9:45 - 10:30 AM	10:30 - 11:30 AM	11:45 - 1:15 PM	1:30 - 3:00 PM	3:00 - 3:30 PM	3:30 - 5:00 PM	7:00 - 10:00 PM	
Crystal A	Sessions				Sessions		Sessions		
Crystal B									
Crystal C									
Crystal D									
Crystal E									
Crystal F									
Crystal G			Plenary: Towards Sustainable Energy and Materials: Carbon Capture and Conversion using Novel Liquid-like Nanoscale Hybrid Particulate Systems Alissa Park, <i>Columbia University</i>						
Crystal H	Exhibits & Lounge	Coffee Break	Exhibits & Lounge	World Congress on Particle Technology Student Poster Session		Coffee Break			
Crystal J1	Sessions				Sessions		Sessions		
Crystal J2									
Crystal K									
Crystal L									
Crystal M									
Crystal N									
Crystal P									
Crystal Q									
Cypress 1/2	Registration								
West Terrace Lawn								WCPT8 Banquet Reception: 7:00 - 7:30 PM Banquet: 7:30 - 10:00 PM	

8TH WORLD CONGRESS ON PARTICLE TECHNOLOGY CONFERENCE **SCHEDULE**



Thursday, April 26						
	8:15 - 9:45 AM	9:45 - 10:30 AM	10:30 - 12:15 PM	12:15 - 1:30 PM	1:30 - 3:00 PM	3:00 PM
Crystal A	Sessions			Lunch Break	Sessions	Conclusion
Crystal B						
Crystal C						
Crystal D						
Crystal E						
Crystal F						
Crystal G			Plenary: An Industrial Perspective on the Future Needs in Solids Processing Research and Education Karl Jacob, <i>The Dow Chemical Company</i>			
Crystal H	Lounge	Coffee Break			Lounge	
Crystal J1	Sessions				Sessions	
Crystal J2						
Crystal K						
Crystal L						
Crystal M						
Crystal N						
Crystal P						
Crystal Q						

FEATURED EVENTS: **PLENARIES**

Monday, April 23, 2018



10:00 AM - 11:00 AM • Crystal Ballroom G

Contact Charging in Granular Materials

Heinrich M. Jaeger, *University of Chicago*

Contact charging of fine, sub-millimeter particles and the resulting clustering is important in circumstances ranging from the early stages of planet formation to industrial powders to airborne pollutants. Even in systems comprised of grains of identical dielectric material, contact charging can generate large amounts of net positive or negative charge on individual particles, resulting in long-range electrostatic forces. Remarkably, even basic aspects of contact charging, such as the nature of the charge carriers or the charge transfer mechanism are still under debate. This talk focuses on recent work where collision events between individual particles are tracked with high-speed video and the charge on single particles can be extracted. In freely falling granular streams we observe collide-and-capture events between charged particles and particle-by-particle aggregation into clusters. Size-dependent contact charging is found to produce a variety of charge-stabilized “granular molecules”, whose configurations can be modeled by taking many-body dielectric polarization effects into account. I will also introduce a new approach, based on ultrasonic levitation, for studying contact charging of single particles. This method allows for measurements under a wide range of environmental conditions as well as applying an electric field, and its exquisite sensitivity makes it possible to determine the charge transferred in a single collision.



11:00 AM - 12:00 PM • Crystal Ballroom G

Mesosience: Opening a New Paradigm of Particle Technology

Jinghai Li, *Chinese Academy of Sciences*

Mesoscale phenomena exist in between “unit” scales and “system” scales at different levels of the real world, spanning from elemental particle to the universe. Understanding of complex processes at mesoscales, characterized by spatiotemporal dynamic structures, is a common challenge for the whole spectrum of science and technology.

This presentation reviews the three decades of research on mesoscales of particulate systems at IPE-CAS. It was initiated by the energy-minimization multiscale (EMMS) model specific for gas-solid fluidization, which established the stability condition or variational function for particle clustering phenomenon. In extending the model to many different complex systems, such as gas-liquid, turbulence, gas-liquid-solid, emulsion, material preparation, protein, and catalysis systems, the EMMS principle was then proposed generally for different complex systems, featuring compromise in competition between different dominant mechanisms in physics and formulated as multi-objective variational problem in mathematics. With increasing understanding of the generality of this principle, the concept of mesosience was further advanced, and is believed to be potentially universal for all complex mesoscale phenomena at different levels.

The presentation will also give a perspective on mesosience. It is believed that more evidence will be needed from various disciplines, particularly, from the field of particle technology where mesoscale phenomena occur everywhere such as in formulating and processing particles. The development of mesosience will enable our capability in particle design, rational synthesis, smart massive production and system optimization due to its underlying principle to bridge unit scales and system scales. In contributing more evidence to mesosience in exploring its universality, in return, the knowledge, tools and methods in particle technology will be upgraded to a new paradigm. In such a paradigm, the theory, computation and experiment at mesoscales will be dominant, and the virtual process engineering will be enabling.

Tuesday, April 24, 2018



10:30 AM - 11:30 AM • Crystal Ballroom G

Nature-Inspired Chemical Engineering - a Pathway to Innovation in Particle Technology

Marc-Olivier Coppens, *University College London*

From the way trees grow and what makes our lungs so efficient, to what renders bacterial communities resilient or how regular patterns form in the sand by the action of the wind – nature holds a treasure trove of ideas to inspire solutions to technological problems. These include some of our most challenging problems in manufacturing, energy, sustainability or healthcare. Many of these problems relate to particle technology. Most often, nature's best solutions to a problem extend beyond first appearances and superficial similarities, and, so, observing nature should go beyond mimicking. Gaining inspiration from nature is most effective in solving technical problems when we have sufficient fundamental understanding that can then be appropriately translated within the context of an application. As in any product and process design, the real power of nature-inspired design requires moving beyond biomimicry, and appreciating the technical, industrial or societal context.

In my presentation, I will illustrate the thematic, mechanistic approach underpinning «nature-inspired chemical engineering» (NICE) and then apply it to timely problems in particle technology. I will focus on three key mechanisms that are ubiquitous in nature. First, efficient hierarchical transport networks, which allow for optimal scalability. Second, balancing of various forces, on large scales (mechanics) but also at the nano-scale, leading to confinement effects, where electrostatics play a key role in issues around selectivity and stability, as well as activity for catalysis or permeation for membranes. Third, dynamic self-organization, which is key to resilience and self-healing properties, as well as pattern formation, both in living and non-living systems.

For applications, we will consider problems in gas-solid fluidization, as well as in the design of hierarchically structured particles, which combine nano-confinement effects and optimized transport across length scales. The NICE approach leads to unexpected, out-of-the-box solutions (innovation), but also to new fundamental insights in, for example, fluidization, especially to tackle outstanding questions in particle technology that revolve around mesoscopic physics, which are key for engineers to translate science at the microscopic scale to the macroscopic world of applications.

Wednesday, April 25, 2018



10:30 AM - 11:30 AM • Crystal Ballroom G

Towards Sustainable Energy and Materials: Carbon Capture and Conversion using Novel Liquid-like Nanoscale Hybrid Particulate Systems

Ah-Hyung (Alissa) Park, *Columbia University*

The atmospheric concentration of CO₂ has naturally fluctuated on the timescales of ice ages. Concerns, however, stem from the recent dramatic increase in CO₂ concentration, which coincides with global industrial development. This rise is mainly due to the high use of fossil fuels during power generation and chemical production. In order to meet the ever-increasing global energy demands while stabilizing the CO₂ level in the atmosphere, the development of carbon capture, utilization and storage technologies is one of the critical needs. In particular, there has been significant efforts to develop CO₂ capture solvents and some have shown very promising results. For example, amine-based aqueous solvents can effectively and selectively capture CO₂ from flue gas of coal-fired power plants. Unfortunately, the energy requirement for the current aqueous solvent systems is still considered to be too high. Thus, efforts have been focused on the development of second and third-generation CO₂ capture solvents which are often water-free. Nanoparticle Organic Hybrid Materials (NOHMs) are a new class of organic-inorganic hybrids that consist of a hard nanoparticle core functionalized with a molecular organic corona that possesses a high degree of chemical and physical tunability. NOHMs are liquid-like, non-volatile and stable over a very wide temperature range, which make them interesting materials for various energy and environmental applications. While their CO₂ capture efficiency and selectivity are great, like other anhydrous CO₂ capture solvents, NOHMs suffer from high viscosity. Thus, an innovative encapsulation system has been developed to create large gas-liquid interfaces for CO₂ capture using these viscous solvents and encapsulated solvents show greatly improved CO₂ capture rates. Furthermore, it has recently been discovered that NOHMs have interesting electrolyte properties which may allow the CO₂ capture to be pulled by the in-situ CO₂ conversion reactions. The development of these unique particulate systems will not only advance CO₂ capture materials design but also introduce unique particle technology research opportunities in various fields.

Thursday, April 26, 2018



10:30 AM - 11:30 AM • Crystal Ballroom G

An Industrial Perspective on the Future Needs in Solids Processing Research and Education

Karl Jacob, *The Dow Chemical Company*

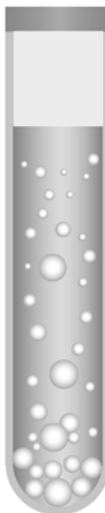
It is easy to get the impression that progress in the field of solids processing has been slow and plodding; however, if we examine the gains in particle technology over the last several decades, we should be proud of the collective accomplishments of the research community. Yet, many problems still persist – old ones still needing a solution (ratholing and dense phase conveying, for example) and new ones that have surfaced as a result of recent technological advances and changes (additive manufacturing, advanced drug delivery, specialty materials and resource conservation to name just a few). This should delight the solids processing research communities in both academia and industry as there are many interesting, challenging and rewarding problems ahead of us. The key research problems across the 15-20 solids processing sub-disciplines will be examined from the viewpoint of their importance to particle technology, engineering science, industry, and more broadly, society as a whole.

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8TH WORLD CONGRESS ON PARTICLE TECHNOLOGY KEYNOTES

MONDAY, APRIL 23, 2018

8:00 AM - 9:30 AM

Cyclone and Hydrocyclone Crystal Ballroom C

8:00 AM: An Empirical Comparison of Two Different Cyclone Designs in the Usage of a Third Stage Separator
Michael Kraxner, *MCI - The Entrepreneurial School*

Fundamentals of Fluidization I Crystal Ballroom F

8:00 AM: A Hydrodynamic Study of Subway Grating and Disk and Donut Trays in a 0.6-m Diameter Fluidized Bed Stripper
Allan Issangya, *Particulate Solid Research, Inc.*

Particle-Based Separations Keynote I Crystal Ballroom J1

8:05 AM: On the Use of Structured Adsorbents in Pressure and Temperature Swing Adsorption Processes
James A. Ritter, *University of South Carolina*

8:50 AM: A New Theoretical-Empirical Model for Cyclone Design
William Heumann, *Heumann Environmental*

1:30 PM - 3:00 PM

Applications Keynote I: Particles in Contact Crystal Ballroom P

1:30 PM: Particles in Contact: The Key Challenge in Solids Processing
Wolfgang Peukert, *Friedrich-Alexander-Universität Erlangen-Nürnberg*

Applications of Particle Technology for Pharmaceuticals Keynote Crystal Ballroom J1

1:30 PM: Toward Simulation-Based Design of Pharmaceutical Processes
Jennifer Sinclair Curtis, *University of California, Davis*

2:00 PM: Novel Technologies to Improve the Bioavailability, Content Uniformity and Manufacturing of Pharmaceuticals
Benjamin Glasser, *Rutgers University*

2:30 PM: Particle Technology Impact on Pharmaceutical Product Performance and Process Design: Past, Present and Future
Chris Sinko, *Bristol-Myers Squibb*

Fundamentals of Fluidization II Crystal Ballroom F

1:30 PM: Particles Wall Coating Due to Electrostatic Charge Generation in Gas-Solid Fluidized Beds in Turbulent Versus Pre-Turbulent Flow Regimes
Poupak Mehrani, *University of Ottawa*

Particle Sorting & Filtration I Crystal Ballroom C

1:30 PM: The Advancement of Fluid/Particle Separation for Environmental Protection
Wu Chen, *The Dow Chemical Company*

3:30 PM - 5:00 PM

Education Keynote Crystal Ballroom J2

3:30 PM: Discovering the Fascinating World of Particle Technology
Shankar Subramaniam, *Iowa State University*

Particle-Based Separations Keynote II Crystal Ballroom J1

3:35 PM: Chemical Looping for Reactive Separation
Christoph Mueller, *ETH Zürich*

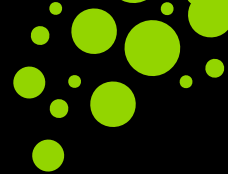
4:20 PM: Demonstration of High Temperature and Pressure Gas-Solid Circulating Chemical Looping Reactor Systems for Syngas and Heat Generation – Particle Reaction Analysis and Pilot Scale Test Results
Andrew Tong, *The Ohio State University*

Particle Design Keynote Crystal Ballroom Q

3:30 PM: Design of Nano/Micro Structures of Hollow, Skeletal, and Porous Particles
Chika Takai, *Nagoya Institute of Technology*

4:10 PM: Unifying Principles of Product Design
Wolfgang Peukert, *Friedrich-Alexander-Universität Erlangen-Nürnberg*

KEYNOTE SPEAKERS



TUESDAY, APRIL 24, 2018

8:15 AM - 9:45 AM

Industrial Applications of Fluidized Beds and Fluidization of Fine Particles
Crystal Ballroom F

8:15 AM: Improving Circulating Dehydrogenation Technology through Optimization of Fluidization
Mayank Kashyap, *SABIC*

1:30 PM - 3:00 PM

Applications Keynote II: Dynamic Solids Flowsheeting
Crystal Ballroom P

1:30 PM: Dynamic Simulation of Interconnected Solids Processes
Stefan Heinrich, *Hamburg University of Technology*

Particle and Nanoparticle Functionalization Keynote
Crystal Ballroom J1

1:30 PM: Atomic Layer Deposition for the Synthesis of Nanostructured Catalysts
Jeffrey W. Elam, *Argonne National Laboratory*

2:15 PM: The R&D on Engineered Particles for Functional Materials in China
Guo-Sheng Gai, *Tsinghua University*

1:30 PM - 3:45 PM

Applications for Sustainable Energy & Environment Keynote
Crystal Ballroom K

1:30 PM: Creating a Pathway to Sustainability: The Critical Contribution of Particle Technology Research
Hamid Arastoopour, *Illinois Institute of Technology*

2:15 PM: Energy Outlook, A View to 2040
Rustom Billimoria, *ExxonMobil*

3:00 PM: Chemical Looping Combustion, Gasification and Reforming – Particle Technology Perspectives
Liang-Shih Fan, *The Ohio State University*

3:30 PM - 5:00 PM

Flow Structures in Risers, Downers, and Bubbling Fluidized Beds
Crystal Ballroom F

3:30 PM: Riser Dynamics – a Comparison of Scale
Ronald W. Breault, *National Energy Technology Laboratory*

WEDNESDAY, APRIL 25, 2018

8:15 AM - 9:45 AM

Computational Aspects of Fundamentals of Fluidization
Crystal Ballroom F

8:15 AM: Turbulent Closure Models for Multiphase Fluids
Charles A. Petty, *Michigan State University*

1:30 PM - 3:00 PM

Computational Approaches in Fluidization Fundamentals I
Crystal Ballroom F

1:30 PM: An Idea of DEM-CFD Coupling Model Decoupling Spatial Averaging Scale from Computational Cell Size
Takuya Tsuji, *Osaka University*

Special Topics in Particle Technology Keynote
Crystal Ballroom J1

1:30 PM: The Vagaries of Granular and Particle Laden Flow
Raffaella Occone, *Heriot-Watt University*

2:15 PM: Scaling Up Particulate Process – Lessons from Industry
Timothy Bell, *DuPont*

THURSDAY, APRIL 26, 2018

8:15 AM - 9:45 AM

Computational Methods for Industrial Fluidization Applications & Process Scale-Up I
Crystal Ballroom F

8:15 AM: The Divide between Academia and Industry in Modeling Gas-Solids Reacting Flows
Sreekanth Pannala, *SABIC*

Electrification and Charge Control I
Crystal Ballroom D

8:15 AM: Electrostatics of Dry Powder Aerosols for Inhalation
Philip Chi Lip Kwok, *The University of Sydney*

8TH WORLD CONGRESS ON PARTICLE TECHNOLOGY

PROGRAMMING **GRIDS**

Property Key ► Marriott = Orlando World Center Marriott ► Crystal = Crystal Ballroom

8th World Congress on Particle Technology Plenaries

Day	Time	Session #	Session Title	Property	Room
Monday	10:00 AM	13	Plenary: Contact Charging in Granular Materials	Marriott	Crystal G
Monday	11:00 AM	94	Plenary: Mesoscience - Opening a New Paradigm of Particle Technology	Marriott	Crystal G
Tuesday	10:30 AM	53	Plenary: Nature-Inspired Chemical Engineering - a Pathway to Innovation in Particle Technology	Marriott	Crystal G
Wednesday	10:30 AM	14	Plenary: Towards Sustainable Energy and Materials: Carbon Capture and Conversion using Novel Liquid-like Nanoscale Hybrid Particulate Systems	Marriott	Crystal G
Thursday	10:30 AM	131	Plenary: An Industrial Perspective on the Future Needs in Solids Processing Research and Education	Marriott	Crystal G

** This session is co-sponsored by one or more programming groups*

8th World Congress on Particle Technology Keynotes

Day	Time	Session #	Session Title	Property	Room
Monday	8:00 AM	5	Cyclone and Hydrocyclone*	Marriott	Crystal C
Monday	8:00 AM	7	Fundamentals of Fluidization I*	Marriott	Crystal F
Monday	8:00 AM	10	Particle-Based Separations Keynote I*	Marriott	Crystal J1
Monday	1:30 PM	15	Applications Keynote I: Particles in Contact*	Marriott	Crystal P
Monday	1:30 PM	16	Applications of Particle Technology for Pharmaceuticals Keynote*	Marriott	Crystal J1
Monday	1:30 PM	21	Fundamentals of Fluidization II*	Marriott	Crystal F
Monday	1:30 PM	25	Particle Sorting & Filtration I*	Marriott	Crystal C
Monday	3:30 PM	31	Education Keynote*	Marriott	Crystal J2
Monday	3:30 PM	36	Particle-Based Separations Keynote II*	Marriott	Crystal J1
Monday	3:30 PM	38	Particle Design Keynote*	Marriott	Crystal Q
Tuesday	8:15 AM	45	Industrial Applications of Fluidized Beds and Fluidization of Fine Particles*	Marriott	Crystal F
Tuesday	1:30 PM	57	Applications Keynote II: Dynamic Solids Flowsheeting*	Marriott	Crystal P
Tuesday	1:30 PM	63	Particle and Nanoparticle Functionalization Keynote*	Marriott	Crystal J1
Tuesday	1:30 PM	67	Applications for Sustainable Energy & Environment Keynote*	Marriott	Crystal K
Tuesday	3:30 PM	70	Flow Structures in Risers, Downers, and Bubbling Fluidized Beds*	Marriott	Crystal F
Wednesday	8:15 AM	83	Computational Aspects of Fundamentals of Fluidization*	Marriott	Crystal F
Wednesday	1:30 PM	98	Computational Approaches in Fluidization Fundamentals I*	Marriott	Crystal F
Wednesday	1:30 PM	109	Special Topics in Particle Technology Keynote*	Marriott	Crystal J1
Thursday	8:15 AM	123	Computational Methods for Industrial Fluidization Applications & Process Scale-Up I*	Marriott	Crystal F
Thursday	8:15 AM	126	Electrification and Charge Control I*	Marriott	Crystal D

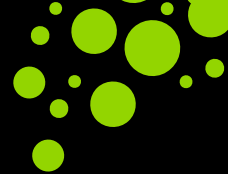
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8th World Congress on Particle Technology Poster Sessions

Day	Time	Session #	Session Title	Property	Room
Tuesday	11:45 AM	54	World Congress on Particle Technology Poster Session	Marriott	Crystal H
Wednesday	11:45 AM	95	World Congress on Particle Technology Student Poster Session	Marriott	Crystal H

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8TH WORLD CONGRESS ON PARTICLE TECHNOLOGY PROGRAMMING **GRIDS**



Particle & Bulk Powder Characterization					
Day	Time	Session #	Session Title	Property	Room
Monday	8:00 AM	2	3D Printing and Characterization of Particulate Materials	Marriott	Crystal A
Monday	1:30 PM	24	Particle Morphology, Size, Density and Surface Texture Characterization I	Marriott	Crystal A
Monday	3:30 PM	33	Measurement Techniques in Fluid-Particle Systems*	Marriott	Crystal F
Monday	3:30 PM	39	Particle Morphology, Size, Density and Surface Texture Characterization II	Marriott	Crystal A
Tuesday	8:15 AM	44	Flow Properties of Particulate Solids I	Marriott	Crystal A
Tuesday	8:15 AM	49	Particle Size/Shape Control*	Marriott	Crystal P
Tuesday	8:15 AM	51	Recent Developments in the Characterization of Pharmaceutical Materials I*	Marriott	Crystal L
Tuesday	11:45 AM	54	World Congress on Particle Technology Poster Session*	Marriott	Crystal H
Tuesday	1:30 PM	58	Flow Properties of Particulate Solids II	Marriott	Crystal A
Tuesday	1:30 PM	62	Measurement Techniques I*	Marriott	Crystal E
Tuesday	1:30 PM	64	Recent Developments in the Characterization of Pharmaceutical Materials II*	Marriott	Crystal L
Tuesday	3:30 PM	69	Flow Properties of Particulate Solids III	Marriott	Crystal A
Tuesday	3:30 PM	72	Measurement Techniques II*	Marriott	Crystal E
Tuesday	3:30 PM	77	Recent Developments in the Characterization of Pharmaceutical Materials III*	Marriott	Crystal L
Wednesday	8:15 AM	85	Micro-Macro Characterization, Relationships Modelling and Engineering Applications	Marriott	Crystal A
Wednesday	11:45 AM	95	World Congress on Particle Technology Student Poster Session*	Marriott	Crystal H
Wednesday	1:30 PM	104	Multi-Scale Particulate Process Modelling and Design: Industry-Led Applications	Marriott	Crystal A
Thursday	8:15 AM	122	Characterization of Nanoparticles I	Marriott	Crystal A
Thursday	1:30 PM	132	Characterization of Nanoparticles II	Marriott	Crystal A

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Particle Interactions					
Day	Time	Session #	Session Title	Property	Room
Monday	8:00 AM	4	Cohesion & Adhesion I	Marriott	Crystal D
Monday	1:30 PM	18	Cohesion & Adhesion II	Marriott	Crystal D
Monday	3:30 PM	28	Attrition	Marriott	Crystal D
Tuesday	8:15 AM	46	Interface Controlled Processes I	Marriott	Crystal D
Tuesday	11:45 AM	54	World Congress on Particle Technology Poster Session*	Marriott	Crystal H
Tuesday	1:30 PM	59	Interface Controlled Processes II	Marriott	Crystal D
Tuesday	1:30 PM	66	Separations with Surface Active Particles*	Marriott	Crystal N
Tuesday	3:30 PM	71	Interface Controlled Processes III	Marriott	Crystal D
Wednesday	8:15 AM	82	Agglomeration	Marriott	Crystal D
Wednesday	11:45 AM	95	World Congress on Particle Technology Student Poster Session*	Marriott	Crystal H
Wednesday	1:30 PM	102	Interparticle Forces I	Marriott	Crystal D
Wednesday	3:30 PM	115	Interparticle Forces II	Marriott	Crystal D
Thursday	8:15 AM	126	Electrification and Charge Control I (Invited Talk)	Marriott	Crystal D
Thursday	8:15 AM	128	Particle-Fluid Reactions*	Marriott	Crystal M
Thursday	1:30 PM	136	Electrification and Charge Control II	Marriott	Crystal D

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8TH WORLD CONGRESS ON PARTICLE TECHNOLOGY

PROGRAMMING GRIDS

Particle Design

Day	Time	Session #	Session Title	Property	Room
Monday	8:00 AM	3	Applications	Marriott	Crystal E
Monday	3:30 PM	38	Particle Design Keynote (Invited Talks)	Marriott	Crystal Q
Tuesday	11:45 AM	54	World Congress on Particle Technology Poster Session*	Marriott	Crystal H
Tuesday	3:30 PM	76	Processing	Marriott	Crystal C
Wednesday	8:15 AM	91	Simulation	Marriott	Crystal C
Wednesday	11:45 AM	95	World Congress on Particle Technology Student Poster Session*	Marriott	Crystal H
Thursday	8:15 AM	124	Crystallization I	Marriott	Crystal C
Thursday	1:30 PM	134	Crystallization II	Marriott	Crystal C

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Handling & Processing of Granular Systems

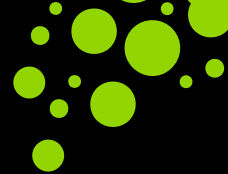
Day	Time	Session #	Session Title	Property	Room
Monday	1:30 PM	26	Pneumatic Conveying - Modeling and Applications	Marriott	Crystal B
Monday	3:30 PM	34	Mechanical Conveying - Modeling and Applications	Marriott	Crystal B
Tuesday	8:15 AM	47	Multi-Phase Granular Systems - Handling and Processing	Marriott	Crystal C
Tuesday	8:15 AM	50	Recent Advances in Dust Control and Safety	Marriott	Crystal B
Tuesday	11:45 AM	54	World Congress on Particle Technology Poster Session*	Marriott	Crystal H
Tuesday	1:30 PM	55	Advances in Attrition, Erosion and Wear	Marriott	Crystal C
Tuesday	1:30 PM	65	Segregation and Mixing - Modeling, Simulations and Applications I	Marriott	Crystal B
Tuesday	3:30 PM	78	Segregation and Mixing - Modeling, Simulations and Applications II	Marriott	Crystal B
Wednesday	8:15 AM	87	Modeling and Simulation of Bulk Solids and Granular Systems	Marriott	Crystal B
Wednesday	11:45 AM	95	World Congress on Particle Technology Student Poster Session*	Marriott	Crystal H
Wednesday	1:30 PM	99	Discrete Element Modeling of Cohesive Materials	Marriott	Crystal B
Wednesday	1:30 PM	101	Industrial Applications of Solids Processing	Marriott	Crystal C
Wednesday	3:30 PM	113	Finite Element Modeling of Granular Materials	Marriott	Crystal B
Wednesday	3:30 PM	114	Industrial and Engineering Applications in Granular Systems	Marriott	Crystal C
Thursday	8:15 AM	125	Design and Analysis of Hoppers, Silos, Chutes & Feeders - Theory and Practice	Marriott	Crystal B
Thursday	1:30 PM	137	Instrumentation, Control and Measurement Systems in Bulk Solids Systems in Processing Plants	Marriott	Crystal B

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Particle & Nanoparticle Functionalization

Day	Time	Session #	Session Title	Property	Room
Monday	8:00 AM	9	Particle and Nanoparticle Functionalization for Biomedicine and Nutrition I	Marriott	Crystal N
Monday	1:30 PM	17	Characterization of Functionalized Particles and Nanoparticles I	Marriott	Crystal N
Monday	1:30 PM	23	Particle and Nanoparticle Functionalization for Biomedicine and Nutrition II	Marriott	Crystal M
Monday	3:30 PM	29	Characterization of Functionalized Particles and Nanoparticles II	Marriott	Crystal N
Tuesday	8:15 AM	48	Particle and Nanoparticle Functionalization for Energy Applications I	Marriott	Crystal N
Tuesday	11:45 AM	54	World Congress on Particle Technology Poster Session*	Marriott	Crystal H
Tuesday	1:30 PM	63	Particle and Nanoparticle Functionalization Keynote (Invited Talk)	Marriott	Crystal J1
Tuesday	3:30 PM	74	Particle and Nanoparticle Functionalization for Catalysis	Marriott	Crystal J1
Tuesday	3:30 PM	75	Particle and Nanoparticle Functionalization for Energy Applications II	Marriott	Crystal N

8TH WORLD CONGRESS ON PARTICLE TECHNOLOGY PROGRAMMING **GRIDS**



Particle & Nanoparticle Functionalization

Wednesday	8:15 AM	89	Particle and Nanoparticle Functionalization for Environmental Applications I	Marriott	Crystal Q
Wednesday	11:45 AM	95	World Congress on Particle Technology Student Poster Session*	Marriott	Crystal H
Wednesday	1:30 PM	106	Particle and Nanoparticle Functionalization for Environmental Applications II	Marriott	Crystal Q
Wednesday	1:30 PM	107	Particle and Nanoparticle Functionalization for Reaction and Separation Processing I	Marriott	Crystal N
Wednesday	3:30 PM	118	Particle and Nanoparticle Functionalization for Reaction and Separation Processing II	Marriott	Crystal N

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Particle Classification

Day	Time	Session #	Session Title	Property	Room
Monday	8:00 AM	5	Cyclone and Hydrocyclone (Invited Talk)*	Marriott	Crystal C
Monday	1:30 PM	25	Particle Sorting & Filtration I (Invited Talk)	Marriott	Crystal C
Monday	3:30 PM	40	Particle Sorting & Filtration II	Marriott	Crystal C
Tuesday	8:15 AM	49	Particle Size/Shape Control*	Marriott	Crystal P
Tuesday	11:45 AM	54	World Congress on Particle Technology Poster Session*	Marriott	Crystal H
Wednesday	11:45 AM	95	World Congress on Particle Technology Student Poster Session*	Marriott	Crystal H

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Fluidization & Multiphase Flow

Day	Time	Session #	Session Title	Property	Room
Monday	8:00 AM	7	Fundamentals of Fluidization I (Invited Talk)	Marriott	Crystal F
Monday	1:30 PM	19	Computational Approaches to Multiphase Heat, Mass Transfer & Reactive Chemistry I	Marriott	Crystal E
Monday	1:30 PM	21	Fundamentals of Fluidization II (Invited Talk)	Marriott	Crystal F
Monday	3:30 PM	30	Computational Approaches to Multiphase Heat, Mass Transfer & Reactive Chemistry II	Marriott	Crystal E
Monday	3:30 PM	33	Measurement Techniques in Fluid-Particle Systems	Marriott	Crystal F
Tuesday	8:15 AM	45	Industrial Applications of Fluidized Beds and Fluidization of Fine Particles (Invited Talk)	Marriott	Crystal F
Tuesday	11:45 AM	54	World Congress on Particle Technology Poster Session*	Marriott	Crystal H
Tuesday	1:30 PM	61	Liquid-Solid and Gas-Liquid-Solid Fluidized Beds	Marriott	Crystal F
Tuesday	1:30 PM	62	Measurement Techniques I	Marriott	Crystal E
Tuesday	3:30 PM	70	Flow Structures in Risers, Downers, and Bubbling Fluidized Beds (Invited Talk)	Marriott	Crystal F
Tuesday	3:30 PM	72	Measurement Techniques II	Marriott	Crystal E
Wednesday	8:15 AM	83	Computational Aspects of Fundamentals of Fluidization (Invited Talk)	Marriott	Crystal F
Wednesday	8:15 AM	88	Novel and Non-Conventional Reactors and Multiphase Flow Systems I	Marriott	Crystal E
Wednesday	11:45 AM	95	World Congress on Particle Technology Student Poster Session*	Marriott	Crystal H
Wednesday	1:30 PM	98	Computational Approaches in Fluidization Fundamentals I (Invited Talk)	Marriott	Crystal F
Wednesday	1:30 PM	105	Novel and Non-Conventional Reactors and Multiphase Flow Systems II	Marriott	Crystal E
Wednesday	3:30 PM	112	Computational Approaches in Fluidization Fundamentals II	Marriott	Crystal F
Wednesday	3:30 PM	117	Novel and Non-Conventional Reactors and Multiphase Flow Systems III	Marriott	Crystal E

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8TH WORLD CONGRESS ON PARTICLE TECHNOLOGY

PROGRAMMING GRIDS

Fluidization & Multiphase Flow

Thursday	8:15 AM	123	Computational Methods for Industrial Fluidization Applications & Process Scale-Up I (Invited Talk)	Marriott	Crystal F
Thursday	8:15 AM	128	Particle-Fluid Reactions*	Marriott	Crystal M
Thursday	8:15 AM	130	Transport Phenomena and Reactor Performance I	Marriott	Crystal E
Thursday	1:30 PM	133	Computational Methods for Industrial Fluidization Applications & Process Scale-Up II	Marriott	Crystal F
Thursday	1:30 PM	139	Transport Phenomena and Reactor Performance II	Marriott	Crystal E

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Applications for Sustainable Energy & Environment

Day	Time	Session #	Session Title	Property	Room
Monday	8:00 AM	6	Energy Conversion Process Fundamentals I	Marriott	Crystal K
Monday	1:30 PM	20	Energy Conversion Process Fundamentals II	Marriott	Crystal K
Monday	3:30 PM	32	Energy Conversion Process Fundamentals III	Marriott	Crystal K
Tuesday	8:15 AM	43	Carbon Capture, Utilization, and Storage and Low-Carbon Energy Conversion I	Marriott	Crystal K
Tuesday	8:15 AM	48	Particle and Nanoparticle Functionalization for Energy Applications I*	Marriott	Crystal N
Tuesday	11:45 AM	54	World Congress on Particle Technology Poster Session*	Marriott	Crystal H
Tuesday	1:30 PM	67	Applications for Sustainable Energy & Environment Keynote (Invited Talks)	Marriott	Crystal K
Tuesday	3:30 PM	75	Particle and Nanoparticle Functionalization for Energy Applications II*	Marriott	Crystal N
Tuesday	4:00 PM	80	Carbon Capture, Utilization, and Storage and Low-Carbon Energy Conversion II	Marriott	Crystal K
Wednesday	8:15 AM	89	Particle and Nanoparticle Functionalization for Environmental Applications I*	Marriott	Crystal Q
Wednesday	8:15 AM	90	Renewable Energy, Bioenergy and Energy Storage I	Marriott	Crystal K
Wednesday	11:45 AM	95	World Congress on Particle Technology Student Poster Session*	Marriott	Crystal H
Wednesday	1:30 PM	106	Particle and Nanoparticle Functionalization for Environmental Applications II*	Marriott	Crystal Q
Wednesday	1:30 PM	108	Renewable Energy, Bioenergy and Energy Storage II	Marriott	Crystal K
Wednesday	3:30 PM	119	Renewable Energy, Bioenergy and Energy Storage III	Marriott	Crystal K

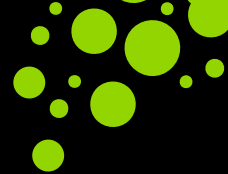
* This session is co-sponsored by one or more programming groups

Particle-Based Separations: Fundamentals & Applications

Day	Time	Session #	Session Title	Property	Room
Monday	8:00 AM	10	Particle-Based Separations Keynote I (Invited Talk)	Marriott	Crystal J1
Monday	3:30 PM	36	Particle-Based Separations Keynote II (Invited Talk)	Marriott	Crystal J1
Tuesday	11:45 AM	54	World Congress on Particle Technology Poster Session*	Marriott	Crystal H
Tuesday	1:30 PM	66	Separations with Surface Active Particles	Marriott	Crystal N
Wednesday	8:15 AM	92	Solid Carriers for Separation and Reactive Separation	Marriott	Crystal N
Wednesday	11:45 AM	95	World Congress on Particle Technology Student Poster Session*	Marriott	Crystal H
Wednesday	1:30 PM	103	Mixing Segregation Principles*	Marriott	Crystal P
Wednesday	1:30 PM	107	Particle and Nanoparticle Functionalization for Reaction and Separation Processing I*	Marriott	Crystal N
Wednesday	3:30 PM	118	Particle and Nanoparticle Functionalization for Reaction and Separation Processing II*	Marriott	Crystal N
Wednesday	3:30 PM	120	Sorbents and Sorbent-Based Separation Processes	Marriott	Crystal M

* This session is co-sponsored by one or more programming groups

8TH WORLD CONGRESS ON PARTICLE TECHNOLOGY PROGRAMMING **GRIDS**



Applications of Particle Technology in Pharmaceuticals

Day	Time	Session #	Session Title	Property	Room
Monday	8:00 AM	8	Modeling of Pharmaceutical Unit Operations I	Marriott	Crystal L
Monday	8:00 AM	9	Particle and Nanoparticle Functionalization for Biomedicine and Nutrition I*	Marriott	Crystal N
Monday	1:30 PM	16	Applications of Particle Technology for Pharmaceuticals Keynote (Invited Talk)	Marriott	Crystal J1
Monday	1:30 PM	23	Particle and Nanoparticle Functionalization for Biomedicine and Nutrition II*	Marriott	Crystal M
Monday	3:30 PM	35	Modeling of Pharmaceutical Unit Operations II	Marriott	Crystal L
Tuesday	8:15 AM	42	Advances in Particle Engineering for Pharmaceutical Applications I	Marriott	Crystal M
Tuesday	8:15 AM	51	Recent Developments in the Characterization of Pharmaceutical Materials I	Marriott	Crystal L
Tuesday	11:45 AM	54	World Congress on Particle Technology Poster Session*	Marriott	Crystal H
Tuesday	1:30 PM	56	Advances in Particle Engineering for Pharmaceutical Applications II	Marriott	Crystal M
Tuesday	1:30 PM	64	Recent Developments in the Characterization of Pharmaceutical Materials II	Marriott	Crystal L
Tuesday	3:30 PM	68	Advances in Particle Engineering for Pharmaceutical Applications III	Marriott	Crystal M
Tuesday	3:30 PM	77	Recent Developments in the Characterization of Pharmaceutical Materials III	Marriott	Crystal L
Wednesday	8:15 AM	81	Advances in Particle Engineering for Pharmaceutical Applications IV	Marriott	Crystal M
Wednesday	8:15 AM	84	Innovations in Scale-Up/Scale-Down of Pharmaceutical Unit Operations	Marriott	Crystal L
Wednesday	11:45 AM	95	World Congress on Particle Technology Student Poster Session*	Marriott	Crystal H
Wednesday	1:30 PM	96	Advances in Particle Engineering for Pharmaceutical Applications V	Marriott	Crystal M
Wednesday	1:30 PM	97	Application of Particle Technology in Drug Design for Improving Patient Compliance I	Marriott	Crystal L
Wednesday	3:30 PM	111	Application of Particle Technology in Drug Design for Improving Patient Compliance II	Marriott	Crystal L
Thursday	8:15 AM	129	Particle Technology Applications to Pharmaceutical Continuous Processes I	Marriott	Crystal L
Thursday	1:30 PM	138	Particle Technology Applications to Pharmaceutical Continuous Processes II	Marriott	Crystal L

** This session is co-sponsored by one or more programming groups*

Applications of Solids Processing Unit Operations

Day	Time	Session #	Session Title	Property	Room
Monday	8:00 AM	5	Cyclone and Hydrocyclone (Invited Talk)*	Marriott	Crystal C
Monday	8:00 AM	8	Modeling of Pharmaceutical Unit Operations I*	Marriott	Crystal L
Monday	8:00 AM	11	Pneumatic Conveying	Marriott	Crystal P
Monday	1:30 PM	15	Applications Keynote I: Particles in Contact (Invited Talk)	Marriott	Crystal P
Monday	1:30 PM	25	Particle Sorting & Filtration I (Invited Talk)*	Marriott	Crystal C
Monday	3:30 PM	35	Modeling of Pharmaceutical Unit Operations II*	Marriott	Crystal L
Monday	3:30 PM	37	Particle Coatings and Solids Processing	Marriott	Crystal P
Monday	3:30 PM	40	Particle Sorting & Filtration II*	Marriott	Crystal C
Tuesday	8:15 AM	45	Industrial Applications of Fluidized Beds and Fluidization of Fine Particles (Invited Talk)*	Marriott	Crystal F

** This session is co-sponsored by one or more programming groups*

8TH WORLD CONGRESS ON PARTICLE TECHNOLOGY

PROGRAMMING GRIDS

Applications of Solids Processing Unit Operations

Tuesday	8:15 AM	49	Particle Size/Shape Control	Marriott	Crystal P
Tuesday	11:45 AM	54	World Congress on Particle Technology Poster Session*	Marriott	Crystal H
Tuesday	1:30 PM	57	Applications Keynote II: Dynamic Solids Flowsheeting (Invited Talk)	Marriott	Crystal P
Tuesday	3:30 PM	79	Spray Drying	Marriott	Crystal P
Wednesday	8:15 AM	86	Mixing and Blending	Marriott	Crystal P
Wednesday	11:45 AM	95	World Congress on Particle Technology Student Poster Session*	Marriott	Crystal H
Wednesday	1:30 PM	101	Industrial Applications of Solids Processing*	Marriott	Crystal C
Wednesday	1:30 PM	103	Mixing Segregation Principles	Marriott	Crystal P
Wednesday	3:30 PM	114	Industrial and Engineering Applications in Granular Systems*	Marriott	Crystal C
Wednesday	3:30 PM	116	Mixing Segregation Simulations: Industrial Application	Marriott	Crystal P
Thursday	8:15 AM	123	Computational Methods for Industrial Fluidization Applications & Process Scale-Up I (Invited Talk)*	Marriott	Crystal F
Thursday	8:15 AM	128	Particle-Fluid Reactions	Marriott	Crystal M
Thursday	1:30 PM	133	Computational Methods for Industrial Fluidization Applications & Process Scale-Up II*	Marriott	Crystal F
Thursday	1:30 PM	135	Drying Applications	Marriott	Crystal M

* This session is co-sponsored by one or more programming groups

Special Topics in Particle Technology

Day	Time	Session #	Session Title	Property	Room
Monday	1:30 PM	22	Industrial Applications of Experimental and Computational Particle Flows	Marriott	Crystal L
Tuesday	8:15 AM	41	Advanced Modeling Techniques for Particle Systems - Discrete and Continuum Approaches	Marriott	Crystal J1
Tuesday	11:45 AM	54	World Congress on Particle Technology Poster Session*	Marriott	Crystal H
Wednesday	11:45 AM	95	World Congress on Particle Technology Student Poster Session*	Marriott	Crystal H
Wednesday	1:30 PM	109	Special Topics in Particle Technology Keynote (Invited Talks)	Marriott	Crystal J1
Wednesday	3:30 PM	110	Advanced Experimental Techniques in All Aspects of Particle Systems	Marriott	Crystal J1

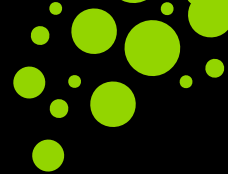
* This session is co-sponsored by one or more programming groups

Education

Day	Time	Session #	Session Title	Property	Room
Sunday	9:00 AM	1	Computational Fluid Dynamics (CFD) Workshop on Particle Technology (Ticketed Event)	Marriott	Crystal A
Monday	8:00 AM	12	Student Workshop on Particle Technology: Part I	Marriott	Crystal J2
Monday	1:30 PM	27	Student Workshop on Particle Technology: Part II	Marriott	Crystal J2
Monday	3:30 PM	31	Education Keynote (Invited Talk)	Marriott	Crystal J2
Tuesday	9:00 AM	52	EMMS Workshop (Ticketed Event)	Marriott	Crystal Q
Tuesday	11:45 AM	54	World Congress on Particle Technology Poster Session*	Marriott	Crystal H
Tuesday	1:30 PM	60	Introduction to Computational Modeling	Marriott	Crystal J2
Tuesday	3:30 PM	73	Nature-Inspired Chemical Engineering Applied to Particle Technology	Marriott	Crystal J2
Wednesday	8:15 AM	93	Workshop on Education in Particle Technology	Marriott	Crystal J2
Wednesday	11:45 AM	95	World Congress on Particle Technology Student Poster Session*	Marriott	Crystal H
Wednesday	1:30 PM	100	Education and New Tools in Instruction for Particle Science and Technology	Marriott	Crystal J2
Wednesday	3:30 PM	121	Troubleshooting in Particle Technology	Marriott	Crystal J2
Thursday	8:15 AM	127	Experiments and Demonstrations in Particle Technology	Marriott	Crystal K

* This session is co-sponsored by one or more programming groups

8TH WORLD CONGRESS ON PARTICLE TECHNOLOGY PROGRAMMING **GRIDS**



Combustible Dust Safety					
Day	Time	Session #	Session Title	Property	Room
Tuesday	8:15 AM	50	Recent Advances in Dust Control and Safety*	Marriott	Crystal B
Tuesday	11:45 AM	54	World Congress on Particle Technology Poster Session*	Marriott	Crystal H
Tuesday	1:30 PM	140	Combustible Dust Hazards and Their Mitigation I*	Marriott	Grand Ballroom 7A
Tuesday	3:30 PM	141	Combustible Dust Hazards and Their Mitigation II*	Marriott	Grand Ballroom 7A
Wednesday	10:15 AM	142	Tutorials in Process Safety - LPS II*	Marriott	Grand Ballroom 8B
Wednesday	11:45 AM	95	World Congress on Particle Technology Student Poster Session*	Marriott	Crystal H
Thursday	1:30 PM	135	Drying Applications*	Marriott	Crystal M

** This session is co-sponsored by one or more programming groups*

Property Key ► Marriott = Orlando World Center Marriott ► Crystal = Crystal Ballroom

(1) Computational Fluid Dynamics (CFD) Workshop on Particle Technology (Ticketed Event)

Sunday, Apr 22, 9:00 AM

Marriott, Crystal A
Reza Mostofi, Chair
Mayank Kashyap, Co-Chair
Sponsored by: Education

9:00 Paper 1a: Introduction to fluidization; Plexiglas mini-circulating fluidized bed demonstration unit comprising a riser, standpipe and cyclone that has the ability to fluidize particles in the core-annular and other flow regimes; Introduction to Barracuda® — **Mayank Kashyap**

10:00 Paper 1b: Conservation laws and constitutive equations (D. Gidaspow. "Multiphase Flow and Fluidization". Academic Press, 1994) — **Dimitri Gidaspow**

10:40 Break

11:10 Paper 1c: Overcoming challenges in a gas-solids CFD model; Simulations using ANSYS Fluent — **Reza Mostofi**

12:00 Lunch Break

1:00 Paper 1d: Formation and elimination of bubbles using IIT multiphase CFD code with input viscosities for the Westinghouse 3 meter fluidized bed (D. Gidaspow & V. Jiradilok. "Computational Techniques". Nova Science Publishers, 2010) — **Dimitri Gidaspow**

1:40 Paper 1e: Multiphase flow science at NETL — **Madhava Syamlal**

2:30 Break

2:40 Paper 1f: Coupling DEM and CFD to optimize particulate flows — **Oleh Baran**

3:30 Break

3:40 Paper 1g: Modified MFI Code to Simulate Hydrodynamics of Gas-Solids Circulating Fluidized Beds — **Huilin Lu**

4:30 Discussion: CFD for designing gas-solids, liquid solids and three phase fluidized bed reactors

(2) 3D Printing and Characterization of Particulate Materials

Monday, Apr 23, 8:00 AM

Marriott, Crystal A
Karen Hapgood, Chair
Jamie Clayton, Co-Chair
Sponsored by: Particle & Bulk Powder Characterization

8:00 Paper 2a: Novel Approaches for the Production of Polymer Powders for Additive Manufacturing — **Jochen Schmidt, Stephanie Kloos, Juan S. Gómez Bonilla, Stefan Romeis, Karl-Ernst Wirth, Wolfgang Peukert**

8:15 Paper 2b: Characterization of Powders for Additive Manufacturing — **Jochen Schmidt, Maximilian A. Dechet, Juan S. Gómez Bonilla, Karl-Ernst Wirth, Wolfgang Peukert**

8:30 Paper 2c: Ceramic Powders in the Laser Sintering Processes — **Daniele Sofia, Diego Barletta, Massimo Poletto**

8:45 Paper 2d: Powder Characterization Workflow for Powder-Bed Based 3D Printing Processes — **Geoffroy Lumay, Filip Francqui**

9:00 Paper 2e: Production of Spherical Polyamide Particles for Additive Manufacturing By Precipitation — **Maximilian A. Dechet, Wolfgang Peukert, Jochen Schmidt**

9:15 Paper 2f: Comparison of Different Flow Assessments for Selective Laser Sintering

Powders — **Elke Riedl, Katja Hartmann, Denis Schütz**

(3) Applications

Monday, Apr 23, 8:00 AM

Marriott, Crystal E
Craig Wheeler, Chair
Sponsored by: Particle Design

8:00 Paper 3a: Effects of Alumina Incorporation By Particle Atomic Layer Deposition on Sintering and Microstructure of Y-Tzp and YSZ — **Rebecca O'Toole, Christopher J. Bartel, Maila Kodas, Alexa Horrell, Sandrine Ricote, Neal P. Sullivan, Austin Drake, Christopher Gump, Robert Hall, Charles B. Musgrave, Alan W. Weimer**

8:20 Paper 3b: Composite Hydrogel Microparticles for Drug Delivery: Microfluidic Preparation, Antibody Functionalisation and Interaction with Cells — **Anna Pittermannova, Anna Hubatova Vackova, Zuzana Ruberova, Ales Zadrazil, Monika Majerska, Denisa Lizonova, Nicolas Bremond, Jerome Bibette, Frantisek Stepanek**

8:40 Break

9:00 Paper 3c: High-Shear Granulation: An Investigation into the Kinetics of Granule Consolidation — **Stefan A. L. de Koster, Kate Pitt, James D. Lister, Rachel Smith**

(4) Cohesion & Adhesion I

Monday, Apr 23, 8:00 AM

Marriott, Crystal D
Stefan Luding, Chair
Urs A. Peuker, Co-Chair
Sponsored by: Particle Interactions

8:00 Paper 4a: AFM Measurements of Adhesion Force on Hydrophobic Surfaces — **Lisa Ditscherlein, Paul Knüpfer, Urs A. Peuker**

8:20 Paper 4b: Flow Optimization in Cohesive Powder Blends:

Identifying and Modeling Impact of Shape and Size on Observed Cohesivity Minimum — **David Goldfarb, Stephen L. Conway, Hirotaka Nakagawa, Sean McClure, Michael Gentzler**

8:40 Paper 4c: Influence of Droplet Size on Particle-Particle Adhesion of Colliding Particles through Droplet: Directnumerical Simulation Study — **Hideya Nakamura, Hiroyuki Kan, Shuji Ohsaki, Satoru Watano**

9:00 Paper 4d: Influence of Filter Cake Thickness during Backwash Regeneration — **Patrick Morsch, Harald Anlauf, Hermann Nirschl**

9:20 Discussion

(5) Cyclone and Hydrocyclone (Invited Talk)

Monday, Apr 23, 8:00 AM

Marriott, Crystal C
Michael Kraxner, Co-Chair
Sponsored by: Particle Classification

8:00 Paper 5a: An Empirical Comparison of Two Different Cyclone Designs in the Usage of a Third Stage Separator — **Michael Kraxner, Tobias Frischmann, Tobias Kofler, Martin Pillei**

8:25 Paper 5b: Numerical Study of Hygroscopic Particle Removal Using a Cyclone Separator with Saturated Water Vapor — **Xiaole Chen, Wenqi Zhong, Bo Wang, Tianchi Yu**

8:45 Paper 5c: Design Criteria for Multi Cyclones in a Limited Space — **Ulrich Muschelknautz**

9:05 Paper 5d: Hydrocyclone Experiments and Design Equations for Produced Water Desanding Operation — **Ilaria Martana, Ivan Saracino, Serena De Maria, Diego Barletta, Massimo Poletto**

(6) Energy Conversion Process Fundamentals I

Monday, Apr 23, 8:00 AM

Marriott, Crystal K

Ning Yang, Chair

John N. Kuhn, Co-Chair

Sponsored by: Applications for Sustainable Energy & Environment

8:00 Paper 6a: Fluidized Bed Torrefaction of Biomass Pellets: Process Performance and Product Quality — **Paola Brachi, Riccardo Chirone, Francesco Miccio, Michele Miccio, Giovanna Ruoppolo**

8:30 Paper 6b: A Novel Model to Forecast the Yield and Composition of the Pyrolysis Products: Reaction Kinetics and Hydrodynamics Study A Novel Model to Forecast the Yield and Composition of the Pyrolysis Products: Reaction Kinetics and Hydrodynamics Study — **Shuli Shu, Sherif Farag, Francois Bertrand, Jamal Chaouki**

9:00 Paper 6c: Investigation of Sludge Conversion during Gasification Process Using Electrical Capacitance Tomography — **Ye Shen, Avi Uzi, Chi-Hwa Wang**

(7) Fundamentals of Fluidization I (Invited Talk)

Monday, Apr 23, 8:00 AM

Marriott, Crystal F

Marc-Olivier Coppens, Chair

Ali Akhavan, Co-Chair

Sponsored by: Fluidization & Multiphase Flow

8:00 Paper 7a: A Hydrodynamic Study of Subway Grating and Disk and Donut Trays in a 0.6-m Diameter Fluidized Bed Stripper — **Allan Issangya, S. B. Reddy Karri, T. M. Knowlton, Ray Cocco, Ben Freireich**

8:22 Paper 7b: Exceptional Intruder Sphere Sinking Due to Local Fluidization of Apparently Fixed Powder Bed — **Jun Oshitani, Toshiki Sasaki, Takuya Tsuji, Derek Y. C. Chan**

8:39 Paper 7c: Structured Flow of Bubbles in Pulsed Fluidized Beds: Pattern Stabilization

and Propagation — **Kaiqiao Wu, Victor Francia, Marc-Olivier Coppens**

8:56 Paper 7d: Intermediate Regime in Particle-Fluid Flow — **Xi Yu, Yassir Makkawi, Raffaella Ocone, Corey Badger, Kokou Dadzie**

9:13 Paper 7e: Density Distribution Stability and Bubbling Behaviors in a Density-Based Air Dense Medium Fluidized Bed: An Experimental Study — **Yuemin Zhao, Jingfeng He, Peng Lv, Zhenfu Luo, Chenlong Duan, Liang Dong, Bo Zhang**

(8) Modeling of Pharmaceutical Unit Operations I

Monday, Apr 23, 8:00 AM

Marriott, Crystal L

Chi-Hwa Wang, Chair

Benjamin J. Glasser, Co-Chair

Carl Wassgren, Co-Chair

Sponsored by: Applications of Particle Technology for Pharmaceuticals

8:00 Paper 8a: Validation of CFD-DEM Simulation of a Continuous Tablet Coating Process — **Peter Boehling, Stefan Mohr, Frederik Detobel, James Holman, Matthew Metzger, Laura Wareham, Sean McClure, Johannes G. Khinast**

8:23 Paper 8b: Modelling of High Shear Wet Granulation Using a Population Balance Framework — **Stefan Bellinghausen, Dana Barrasso, Emmanuela Gavi, Laura Jerke, Agba Salman, James D. Litster**

8:46 Paper 8c: Prediction of Pressure Filtration Performance in Systems with Pharmaceutical High Aspect Ratio Crystals — **Ioannis S. Fragkopoulos, Bilal Ahmed, Claire MacLeod, Frans L. Muller**

9:08 Paper 8d: Development of Continuous Manufacturing of Pharmaceuticals and Its Monitoring and Control — **Satoru Watano, Kanae Takayama, Sanae Nara, Hideya Nakamura, Shuji Ohsaki**

(9) Particle and Nanoparticle Functionalization for Biomedicine and Nutrition I

Monday, Apr 23, 8:00 AM

Marriott, Crystal N

Alexandra Teleki, Chair

Georgios A. Sotiriou, Co-Chair

Antonio Tricoli, Co-Chair

Sponsored by: Particle & Nanoparticle Functionalization

8:00 Paper 9a: UV Light-Inhibited Release for Time Controlled Growth Factor Delivery from TiO₂ Nanoparticles in a Molecular Hydrogel (Invited) — **David R. Nisbet**

8:30 Paper 9b: Investigating Functionalized Particle – Microbe Interactions on ‘Touch’ Surfaces — **Vignesh Nandakumar, Vasanthakumar Balasubramanian, Brij M. Moudgil**

8:50 Paper 9c: Green Synthesis of Fluorescent Nanomaterials for Optical Bioimaging and Beyond — **Dan Wang, Yuan Pu, Jie-Xin Wang, Jian-Feng Chen**

9:10 Paper 9d: Superparamagnetic Nanoparticles for Triggered Drug Release from Alginate Hydrogels — **Alexandra Teleki, Georgios A. Sotiriou**

(10) Particle-Based Separations Keynote I (Invited Talk)

Monday, Apr 23, 8:00 AM

Marriott, Crystal J1

Fanxing Li, Chair

A. Issangya, Co-Chair

Sponsored by: Particle-Based Separations: Fundamentals & Applications

8:00 Introductory Remarks

8:05 Paper 10a: On the Use of Structured Adsorbents in Pressure and Temperature Swing Adsorption Processes — **James A. Ritter, Armin D. Ebner**

8:45 Intermission

8:50 Paper 10b: A New Theoretical-Empirical Model for Cyclone Design — **William Heumann, Thomas Cushing**

(11) Pneumatic Conveying

Monday, Apr 23, 8:00 AM

Marriott, Crystal P

Haim Kalman, Chair

Sponsored by: Applications of Solids Processing Unit Operations

8:00 Paper 11a: Algorithm to Enhance Performance of Dilute Phase Pneumatic Conveying Systems — **Jonathan O. Thorn**

8:22 Paper 11b: Investigations on Heat Transfer in Dilute Two-Phase Flow during Pneumatic Conveying — **Hanno Wolf, Jens Dittmann, Frank Kleine-Jäger**

8:44 Paper 11c: Effect of Flow Aids on Calcium Carbonate Flow Rate in the Dilute Phase Pneumatic Conveying System — **Johnselvakumar Lawrence, Amit K. Gautam, Jason Brantley, Matthew Haugh**

9:06 Paper 11d: The Effect of Fluid on Particles Conveying in Pipes — **Haim Kalman, Naveen M. Tripathi, Ofek G. Gabrieli, Dmitry Portnikov**

(12) Student Workshop on Particle Technology: Part I

Monday, Apr 23, 8:00 AM

Marriott, Crystal J2

Mayank Kashyap, Chair

S. B. Reddy Karri, Co-Chair

Sponsored by: Education

8:00 Paper 12a: Student Workshop on Particle Technology I — **Mayank Kashyap, Reddy Karri**

(13) Plenary: Contact Charging in Granular Materials (Invited Talk)

Monday, Apr 23, 10:00 AM

Marriott, Crystal G

Ray Cocco, Chair

Sponsored by: 8th World Congress on Particle Technology Plenaries

10:00 Paper 13a: Contact Charging in Granular Materials — **Heinrich M. Jaeger**

(14) Plenary: Towards Sustainable Energy and Materials: Carbon Capture and Conversion using Novel Liquid-like Nanoscale Hybrid Particulate Systems (Invited Talk)

Wednesday, Apr 25, 10:30 AM

Marriott, Crystal G
Ray Cocco, Chair
Sponsored by: 8th World Congress on Particle Technology Plenaries

10:30 Paper 14a: Towards Sustainable Energy and Materials: Carbon Capture and Conversion using Novel Liquid-like Nanoscale Hybrid Particulate Systems — **Ah-Hyung Alissa Park**

(15) Applications Keynote I: Particles in Contact (Invited Talk)

Monday, Apr 23, 1:30 PM

Marriott, Crystal P
Haim Kalman, Chair
Bruce D. Hook, Co-Chair

Sponsored by: Applications of Solids Processing Unit Operations

1:30 Paper 15a: Particles in Contact: The Key Challenge in Solids Processing — **Wolfgang Peukert**

2:20 Paper 15b: Impact Behavior of Microparticles on Component Surfaces Considering the Micro-Topography: Experiment and DEM Simulation — **Fabian Krull, Sergiy Antonyuk**

(16) Applications of Particle Technology for Pharmaceuticals Keynote (Invited Talk)

Monday, Apr 23, 1:30 PM

Marriott, Crystal J1
Chi-Hwa Wang, Chair
Brenda Remy, Co-Chair
Sponsored by: Applications of Particle Technology for Pharmaceuticals

1:30 Paper 16a: Toward Simulation-Based Design of Pharmaceutical Processes — **Jennifer Sinclair Curtis**

2:00 Paper 16b: Novel Technologies to Improve the Bioavailability, Content

Uniformity and Manufacturing of Pharmaceuticals — **Benjamin J. Glasser, Plamen I. Grigorov, Thamer Omar, Fernando J. Muzzio**

2:30 Paper 16c: Particle Technology Impact on Pharmaceutical Product Performance and Process Design: Past, Present and Future — **Chris Sinko**

(17) Characterization of Functionalized Particles and Nanoparticles I

Monday, Apr 23, 1:30 PM

Marriott, Crystal N
Dong-Yeun Koh, Chair
Karsten Wegner, Co-Chair
Sponsored by: Particle & Nanoparticle Functionalization

1:30 Paper 17a: The Silanol Content of Silica Nanoparticles (Invited) — **Anastasia Spyrogianni, Inge K. Herrmann, Kerda Keevend, Sotiris E. Pratsinis, Karsten Wegner**

2:00 Paper 17b: Unraveling the Process of Ligand Adsorption to Heterogeneous Colloidal Substrates By Means of Catechols Binding to ZnO Nanoparticles (Invited) — **Doris Segets, Wei Lin, Rebecca Dinkel, Björn Braunschweig, Wolfgang Peukert**

2:30 Paper 17c: Stealth Nanoparticles for Tumor Targeting: *In Vivo* and *In Vitro* Characterization (Invited) — **Denisa Lizonova, Frantisek Stepanek, Vlastimil Kral, Marek Kovar, Michal Pechar, Robert Pola**

(18) Cohesion & Adhesion II

Monday, Apr 23, 1:30 PM

Marriott, Crystal D
Stefan Luding, Chair
Urs A. Peuker, Co-Chair
Sponsored by: Particle Interactions

1:30 Paper 18a: Understanding Adhesive Mixing Via Energy-Based Stick/Bounce Model — **Kai Zheng, Rajesh Davé**

1:50 Paper 18b: CFD-DEM Modelling of Dilute-Phase Pneumatic Transport of Cohesive Dairy Powder in a Stainless Steel

Pipe — **Akeem Olaleye, Orest Shardt, Harry E.A. Van den Akker**

2:10 Paper 18c: DEM Simulation of Wet Particulate Flow over a Circular Cylinder — **Hongsheng Chen, Ran Tao, Huang Zhang, Shuiqing Li**

2:30 Paper 18d: Review of Contact Models for Cohesive-Frictional Materials and Applications — **Stefan Luding**

2:50 Discussion

(19) Computational Approaches to Multiphase Heat, Mass Transfer & Reactive Chemistry I

Monday, Apr 23, 1:30 PM

Marriott, Crystal E
Justin Federici, Chair
Xi Gao, Co-Chair
Sponsored by: Fluidization & Multiphase Flow

1:30 Paper 19a: Modelling of Chemical Reactions in Metallurgical Processes — **Mustafa Efe Kinaci, Thomas Lichtenegger, Simon Schneiderbauer**

1:52 Paper 19b: Modeling Mass Transfer in Hydraulic Conveying of Salt Particles Using CFD-DEM Numerical Simulation — **Gal Beit-Halevy, Avi Levy, Avi Uzi**

2:14 Paper 19c: Bubbling and Slugging of Geldart Group a Particles in Small Diameter Columns: Experiments and 3D Numerical Simulations — **Florian Sabatier, Renaud Ansart, Weibin Kong, Huili Zhang, Gilles Flamant, Olivier Simonin**

2:36 Paper 19d: Effect of Fuel Heap Shape on Air Flow in a Side-Fed Biomass Gasifier Based on DEM-CFD Simulation — **Yuan Tan, Michael Rackl, Johannes Fottner**

(20) Energy Conversion Process Fundamentals II

Monday, Apr 23, 1:30 PM

Marriott, Crystal K
Ning Yang, Chair
John Kuhn, Co-Chair
Sponsored by: Applications

for Sustainable Energy & Environment

1:30 Paper 20a: Development of Iron-Based Fischer-Tropsch Reactor Particle Management and Gas-Solid Fluidized Bed Activation Technology — **Zhuowu Men, Yonglong Li, Yifeng Bu, Liu Hai Feng**

2:00 Paper 20b: Challenges and State of Art of Multiphase Flow Modeling in F-T Synthesis — **Ning Yang, Xiaoping Guan**

2:30 Paper 20c: A Transient DEM-Based Virtual Experimental Blast Furnace Model Realized through Scaling — **Qinfu Hou**

(21) Fundamentals of Fluidization II (Invited Talk)

Monday, Apr 23, 1:30 PM

Marriott, Crystal F
S. B. Reddy Karri, Chair
Raymond Lau, Co-Chair
Sponsored by: Fluidization & Multiphase Flow

1:30 Paper 21a: Particles Wall Coating Due to Electrostatic Charge Generation in Gas-Solid Fluidized Beds in Turbulent Versus Pre-Turbulent Flow Regimes — **Di Song, Poupak Mehrani**

1:52 Paper 21b: Process Intensification By Miniaturization of Fluidized Beds — **Vladimir Zivkovic, Richard Law, Kamelia Boodhoo, David A. Reay**

2:09 Paper 21c: Scaling Analysis of Rectangular Spouted Bed Dynamics — **Steven Rowan, Jingsi Yang, Ronald W. Breault**

2:26 Paper 21d: On the Mechanism of Anomalous Sphere Sinking in Apparently Fixed Particle Beds (Discrete Particle Simulation and Ultra-Fast MRI Measurement) — **Takuya Tsuji, Alexander Penn, Taisuke Hattori, Klaas P. Pruessmann, Christoph R. Müller, Jun Oshitani**

2:43 Paper 21e: Flow Structure Study on Expanded Bed in Gas Fluidization of Fine Ellipsoids — **Jieqing Gan, Zongyan Zhou, Aibing Yu**

(22) Industrial Applications of Experimental and Computational Particle Flows

Monday, Apr 23, 1:30 PM
Marriott, Crystal L
William R. Ketterhagen, Co-Chair
Yi Fan, Co-Chair
Sponsored by: Special Topics in Particle Technology

1:30 Paper 22a: Advanced Residue Fluid Catalytic Cracking (RFCC) Regenerator Analysis — **Lev Davydov, Azita Ahmadzadeh, Reza Mostofi**

1:52 Paper 22b: A Numerical Study on Steric Crowding Effect in Inertial Microfluidics — **Hirotake Udono, Mikio Sakai**

2:14 Paper 22c: Assessment of Powder Cohesion Strength Using Shear Cell and Warren Spring Cohesion Testers — **Camila Garcia Jange, Abhishek Shetty, Rose Prabin Kingsly Ambrose**

2:36 Paper 22d: Simulating Radiation and Conduction in an Aggregate Dryer Using Coupled CFD-DEM — **Andrew Hobbs**

(23) Particle and Nanoparticle Functionalization for Biomedicine and Nutrition II

Monday, Apr 23, 1:30 PM
Marriott, Crystal M
Alexandra Teleki, Chair
Georgios A. Sotiriou, Co-Chair
Antonio Tricoli, Co-Chair
Sponsored by: Particle & Nanoparticle Functionalization

1:30 Paper 23a: Heterogeneous Liposome Assemblies: When Soft Meets Hard (Invited) — **Jaroslav Hanus, Jan Hasa, Martin Balouch, Frantisek Stepanek**

2:00 Paper 23b: Magnetic Iron Oxide Nanoparticles As a Local Source of Heat for Remotely Controlled Reaction — **Ayse Beyza Aysan, Zdenek Knejzlik, Ales Zadrazil, Frantisek Stepanek**

2:20 Paper 23c: Multi-Scale Engineering of Biomedical Made Nanomaterials and Devices By Scalable Flame Synthesis — **Antonio Tricoli**

2:40 Paper 23d: Targeting and Killing Melanoma Cancer Using Photoactivated Nanoparticles — **Olivia George, Andre Gesquiere**

(24) Particle Morphology, Size, Density and Surface Texture Characterization I

Monday, Apr 23, 1:30 PM
Marriott, Crystal A
Giuseppe Bonifazi, Chair
Harald Kruggel-Emden, Co-Chair
Sponsored by: Particle & Bulk Powder Characterization

1:30 Paper 24a: A Demonstration of Bootstrap Method for Particle Diameter Distribution Analysis — **Tatsushi Matsuyama**

1:45 Paper 24b: A New Particle Morphology Characterization to Account for Surface Angularity and Experimental Validation through 3D Printing — **Sumana Bhattacharya, Seung Jae Lee, Yu-Feng Su, Chang Hoon Lee, Moochul Shin**

2:00 Paper 24c: Determination of Primary Particle Size Distributions of Agglomerates on Transmission Electron Microscopy Images By Artificial Neural Networks — **Einar Kruis, Max Frei**

2:15 Paper 24d: Multi-Wavelength Photo-Centrifugation for Particle Sizing without Reference to Models for the Optical Behaviour — **Frank Babick, Torsten Detloff, Dietmar Lerche**

2:30 Paper 24e: Characterization of Particle Size and Shape with a Novel 3D Light Scattering Sensor (3D-LSS) for Aerosols — **Michael Pitz, Sergiy Antonyuk**

2:45 Paper 24f: Two-Dimensional to Three-Dimensional Conversion Method for Multiple Characteristics of Particular Systems — **Takao Ueda, Tatsuya Oki, Shigeki Koyanaka**

(25) Particle Sorting & Filtration I (Invited Talk)

Monday, Apr 23, 1:30 PM
Marriott, Crystal C
Susanne Wolff, Co-Chair

Junwu Wang, Co-Chair
Sponsored by: Particle Classification

1:30 Paper 25a: Keynote Presentation: The Advancement of Fluid/Particle Separation for Environmental Protection — **Wu Chen**

2:00 Paper 25b: Atomic Scale Engineering of Polymer Fibers for Enhanced Filtration Performance — **George G. Chase, Darrell H. Reneker, Dinesh Lolla, Harshal Gade**

2:20 Paper 25c: Wet Classification of Fine Particles Using Crossflow Filtration — **Philipp Loesch, Sergiy Antonyuk**

2:40 Paper 25d: Study of Dry Beneficiation of Coal Particles in Air Dense Medium Fluidized Bed using CFD-DEM Method — **Yong Zhang, Yuemin Zhao, Chenlong Duan, Junwu Wang, Wei Ge**

(26) Pneumatic Conveying - Modeling and Applications

Monday, Apr 23, 1:30 PM
Marriott, Crystal B
George Klinzing, Chair
Francisco Cabrejos, Co-Chair
Sponsored by: Handling & Processing of Granular Systems

1:30 Break

1:52 Paper 26a: Study on the Feeding Characteristics of Pulverized Coal for Entrained-Flow Gasification — **Haifeng Lu, Xiaolei Guo, Xin Gong**

2:14 Paper 26b: Applications of Eductors in Pneumatic Conveying — **Gary Liu, Timothy Bell**

2:36 Paper 26c: Application of Pneumatic Conveying Principles to Air Pollution Control in Power Stations — **David A. Craig, Eric Maynard, Joshua Marion, Daniel Herzberg**

(27) Student Workshop on Particle Technology: Part II

Monday, Apr 23, 1:30 PM
Marriott, Crystal J2
Shrikant Dhodapkar, Chair
Sponsored by: Education

1:30 Paper 27a: Student Workshop on Particle Technology II — **Shrikant Dhodapkar**

(28) Attrition

Monday, Apr 23, 3:30 PM
Marriott, Crystal D
Carl Wassgren, Co-Chair
Sponsored by: Particle Interactions

3:30 Paper 28a: High Speed Video Imaging of Jet Cup Attrition Hydrodynamics — **Kelsey Bailey, Akvile Puraite, Rasa Kales, Ray Cocco, Ben Freireich**

3:48 Paper 28b: The Stress, Orientation, Displacement Deviation, and Solid Fraction Predictions from a Modified Attrition Cell Containing Needle-Shaped Particles — **Rohit Kumar, Avik Sarkar, William R. Ketterhagen, Bruno C. Hancock, Jennifer Sinclair Curtis, Carl R. Wassgren**

4:06 Paper 28c: Attrition Prediction of Grid Jets in Fluidized Bed Systems — **Nathan Galinsky, Samuel Bayham, Ronald W. Breault**

4:24 Paper 28d: "Perfect Particles" - 3D Printing of Tuneable Agglomerates for Validation of DEM Breakage Models — **Ruihuan Ge, Tina Bonakdar, Ian Larson, Zongyan Zhou, Mojtaba Ghadiri, Karen P. Haggood**

4:42 Paper 28e: Particle Attrition: Mechanisms and Jet Cup Attrition Method — **Yeook Arrington, Reddy Karri, Ray Cocco, Ben Freireich**

(29) Characterization of Functionalized Particles and Nanoparticles II

Monday, Apr 23, 3:30 PM
Marriott, Crystal N
Dong-Yeun Koh, Chair
Karsten Wegner, Co-Chair
Sponsored by: Particle & Nanoparticle Functionalization

3:30 Paper 29a: Viscoelasticity of Epoxy Nano-Composites (Invited) — **Suresh Ahuja**

4:00 Paper 29b: ALD-Formed Cobalt/Alumina Nanostructures Active for Fischer-Tropsch Synthesis — **Jacob M. Clary**, Staci A. Van Norman, Dong Su, Eric A. Stach, John Falconer, Charles B. Musgrave, Alan W. Weimer

4:20 Paper 29c: Synthesis and Characterization of Polyester and Polyamide Microcapsules for Vitamin E Encapsulation — **Mónica Simões**, Patrícia Coimbra, Ana Carreira, Maria Helena Gil, Maria Margarida Figueiredo, Pedro Nuno Simões

4:40 Paper 29d: Green Synthesis, Characterization and Physical Properties of Silver Nanoparticle Embedded in PVA — **Amjed AlSultani**, Maythem Hussain, Mohammed Hadi

(30) Computational Approaches to Multiphase Heat, Mass Transfer & Reactive Chemistry II

Monday, Apr 23, 3:30 PM
Marriott, Crystal E
Clay Sutton, Chair
Mayank Kashyap, Co-Chair
Sponsored by: Fluidization & Multiphase Flow

3:30 Paper 30a: Modeling of Heat and Momentum Transfer in the Context of Moving Particles By a Double MRT Lattice Boltzmann Scheme — **Bogdan Kravets**, Harald Kruggel-Emden

3:52 Paper 30b: Combining High and Low-Order Computational Models to Simulate Biomass Fast Pyrolysis Reactors — **Gavin Wiggins**, Emilio Ramirez, Jonathan E. Sutton, Charles E. A. Finney, C. Stuart Daw

4:14 Paper 30c: Experimental and Numerical Investigation of a Three-Dimensional Prismatic Spouted Bed with Liquid Injection — **Swantje Pietsch**, Paul Kieckhefer, Stefan Heinrich, Michael Müller, Michael Schönherr, Frank Kleine Jäger

4:36 Paper 135d: CFD-DEM Simulation for Drying of Food Grain in a Fluidised Bed — **Jannatul Azmir**, Qinfu Hou, Aibing Yu

(31) Education Keynote (Invited Talk)

Monday, Apr 23, 3:30 PM
Marriott, Crystal J2
Mayank Kashyap, Chair
George Klinzing, Co-Chair
Sponsored by: Education

3:30 Paper 31a: Discovering the Fascinating World of Particle Technology — **Shankar Subramaniam**

(32) Energy Conversion Process Fundamentals III

Monday, Apr 23, 3:30 PM
Marriott, Crystal K
Ning Yang, Chair
John N. Kuhn, Co-Chair
Sponsored by: Applications for Sustainable Energy & Environment

3:30 Paper 32a: Study on the Coke Distribution on Catalyst for MTO Fluidized Bed Reactor-Regenerator System — **Hua Li**, Xiaoshuai Yuan, Mao Ye, Zhongmin Liu

4:00 Paper 32b: Simulation Study on the Reaction-Diffusion Coupling Processes in Simple Pore Structures — **Yanping Li**, Mingcan Zhao, Chengxiang Li, Wei Ge

4:30 Paper 32c: Enhanced CO₂ Conversion to CO By Silica Supported Perovskite Oxides at Low Temperatures — **Bryan J. Hare**, Debtanu Maiti, Yolanda A. Daza, Venkat R. Bhethanabotla, John N. Kuhn

(33) Measurement Techniques in Fluid-Particle Systems

Monday, Apr 23, 3:30 PM
Marriott, Crystal F
J. Ruud van Ommen, Chair
Casey LaMarche, Co-Chair
Sponsored by: Fluidization & Multiphase Flow

3:30 Paper 33a: Importance of Cohesion Strength Measurements As Flowability Indicator of Powders in a Fluidized Bed — **Pablo Garcia Triñanes**, Denis Schütz, Stefan Zigan

3:48 Paper 33b: Investigation into the Attrition Behaviour of FCC Catalysts — **Pablo Garcia Triñanes**, Benjamin Kotzur, Rob Berry, Mike Bradley

4:06 Paper 33c: Particle Tracking Velocimetry Measurements for CFD-DEM Validation — **Casey Q. LaMarche**, Peiyuan Liu, William Fullmer, Christine M. Hrenya, Ray Cocco

4:24 Paper 33d: Experimental Verification of Solid-like and Fluid-like States in Homogeneous Fluidization Regime of Geldart a Particles — **Qiang Guo**, Shuanghe Meng, Yinfeng Zhao, Likun Ma, Mao Ye, Wuqiang Yang, Zhongmin Liu

4:42 Paper 33e: Magnetic Resonance Imaging and Modeling of Liquid-Solid Fluidization — **Christopher M. Boyce**, Alexander Penn, Klaas P. Pruessmann, Christoph R. Müller

(34) Mechanical Conveying - Modeling and Applications

Monday, Apr 23, 3:30 PM
Marriott, Crystal B
Craig Wheeler, Chair
David A. Craig, Co-Chair
Sponsored by: Handling & Processing of Granular Systems

3:30 Paper 34a: A Comparison between the Motion Resistances of the Rail Conveyor and Belt Conveyors — **Craig Wheeler**, Michael Carr, Bin Chen

3:52 Paper 34b: Analysis of the Flexure Resistance of Conveyor Belt: Development of a New Experimental Method — **Brendan Beh**, Craig Wheeler

4:14 Paper 34c: Application of Open Source FEM and DEM for Dynamic Conveyor Belt Deflection Modelling — **Jiahe Shen**, Craig Wheeler

4:36 Paper 34d: An Investigation of Grians Conveying Based on Vertical Vibration —

(35) Modeling of Pharmaceutical Unit Operations II

Monday, Apr 23, 3:30 PM
Marriott, Crystal L
Chi-Hwa Wang, Chair
Benjamin J. Glasser, Co-Chair
Carl Wassgren, Co-Chair
Sponsored by: Applications of Particle Technology for Pharmaceuticals

3:30 Paper 35a: A Compartmental Population Balance Modelling of Continuous Twin Screw Wet Granulation Using Mechanistic Process Kernels — **Li Ge Wang**, Shankali U. Pradhan, John Morrissey, Dana Barrasso, Kevin Hanley, Jin Ooi, Carl Wassgren, James D. Litster

3:48 Paper 35b: Understanding Powder Transfer in Force Feeders of Tableting Machines: A Comparison — **Claudia Hildebrandt**, Srikanth R. Gopireddy, Regina Scherließ, Nora A. Urbanetz

4:06 Paper 35c: A Development of Combined PBM-RTD Technique to Simulate Continuous Wet Granulation Systems for Pharmaceutical Manufacturing Processes — **Shashank Muddu**, Rohit Ramachandran

4:24 Paper 35d: Development and Application of Coupled CFD-DEM Models for Complex FLUID Particle Systems (FIBROUS MATERIAL, SLURRIES ETC...) in Industrial Scale Processes — **Lucilla Almeida**, Rahul Bharadwaj

4:42 Paper 35e: Investigation the Complex Gas-Solids Flow Characteristics in a Fluidized Bed with Wurster Tube By Process Tomography and CFD Simulation — **Haigang Wang**, Hanqiao Che, Qiuya Tu, Jiamin Ye, Wuqiang Yang

(36) Particle-Based Separations Keynote II (Invited Talk)

Monday, Apr 23, 3:30 PM
Marriott, Crystal J1
Allan Issangya, Chair
Fanxing Li, Co-Chair



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Sponsored by: Particle-Based Separations: Fundamentals & Applications

3:30 Introductory Remarks

3:35 Paper 36a: Chemical Looping for Reactive Separation — **Christoph Mueller**

4:15 Intermission

4:20 Paper 36b: Demonstration of High Temperature and Pressure Gas-Solid Circulating Chemical Looping Reactor Systems for Syngas and Heat Generation – Particle Reaction Analysis and Pilot Scale Test Results — **Andrew Tong, Dawei Wang, L.-S. Fan**

(37) Particle Coatings and Solids Processing

Monday, Apr 23, 3:30 PM

Marriott, Crystal P

Bruce D. Hook, Co-Chair

Sponsored by: Applications of Solids Processing Unit Operations

3:30 Paper 37a: Modelling Single Droplet Drying and Morphology Evolution at High Temperature — **Tien Nguyen, Muzammil Ali, Andrew E. Bayly**

4:00 Paper 37b: Tracking Single Particle Temperature during Hot Melt Coating in the Free Stream — **Johannes A. Lindner, Heiko Briesen**

4:30 Paper 37c: The Design and Operation of Multi-Point Dust Collection Systems — **Yi Fan, Karl Jacob, James F. Koch**

(38) Particle Design Keynote (Invited Talks)

Monday, Apr 23, 3:30 PM

Marriott, Crystal Q

Yongsheng Han, Chair

Ben Freireich, Co-Chair

Sponsored by: Particle Design

3:30 Paper 38a: Design of Nano/Micro Structures of Hollow, Skeletal, and Porous Particles — **Chika Takai, Masayoshi Fujii**

4:10 Paper 38b: Unifying Principles of Product Design — **Wolfgang Peukert**

(39) Particle Morphology, Size, Density and Surface Texture Characterization II

Monday, Apr 23, 3:30 PM

Marriott, Crystal A

Giuseppe Bonifazi, Chair

Harald Kruggel-Emden, Co-Chair

Sponsored by: Particle & Bulk Powder Characterization

3:30 Break

3:45 Paper 39a: Use of Acoustic Backscatter Systems to Characterise Concentrated Dispersions — **Timothy N. Hunter, Jaiyana Bux, Hugh Rice, Alastair Tonge, Martyn Barnes, Simon Biggs, Jeffrey Peakall**

4:00 Paper 39b: Classification and Regression Modelling for Investigating the Effect of Particle Size and Morphology on the Functionality of Industrial Spray Dried Milk Powder — **Irina Boiarkina, Wei Yu, Arrian Prince-Pike, Nick Depree, David I. Wilson, Brent R. Young**

4:15 Paper 39c: Electrochemical Characteristic Evaluation of Lithium-Ion Battery Slurry By a Multi-Sensing Electrochemical Impedance Spectroscopy System — **Masanori Kanzawa, Zhilong Wang, Tong Zhao, Masahiro Takei**

4:30 Paper 39d: Influence of Shearing As Pretreatment on the Separation Properties of Exopolysaccharides (EPS) Producing Bacterial Starter Cultures — **Florian Häftele, Susann Mende, Doris Jaros, Harald Rohm, Hermann Nirschl**

4:45 Paper 39e: The Effect of Surface Chemistry on the Surface Energetics of Homogenous and Heterogeneous Physical Mixtures of Mannitol — **Vikram Karde, Robert R. Smith, Jerry Y. Y. Heng**

(40) Particle Sorting & Filtration II

Monday, Apr 23, 3:30 PM

Marriott, Crystal C

Susanne Wolff, Co-Chair

Junwu Wang, Co-Chair

Sponsored by: Particle Classification

3:30 Paper 40a: Rejection Mechanisms of ZnS Quantum Dots and Au Nanoparticles and Selection of Membrane Filters for Ultrafiltration and Nanofiltration — **Handol Lee, Doris Segets, David Y.H. Pui, Sheng-Chieh Chen**

3:52 Paper 40b: Discrete and Continuum Modeling of Granular Flow in Silo Discharge — **Xiaoxing Liu**

4:14 Paper 40c: Fluidization Characteristics and Separation Performance of an Air Dense Medium Gas-Solid Fluidized Bed Based on the Secondary Air Distribution Layer — **Jingfeng He, Yake Yao, Yuemin Zhao, Chenlong Duan**

4:36 Paper 40d: Demonstrating the Use of Artificial Intelligence for Classification of Crystalline Particle Images — **Antony D. Vassileiou, Blair F. Johnston**

(41) Advanced Modeling Techniques for Particle Systems - Discrete and Continuum Approaches

Tuesday, Apr 24, 8:15 AM

Marriott, Crystal J1

Alberto Passalacqua, Co-Chair

Madhusudhan Kodam, Co-Chair

Sponsored by: Special Topics in Particle Technology

8:15 Paper 41a: Modeling of Simultaneous Particle Attrition and Pipe Wear — **Avi Uzi, Avi Levy**

8:33 Paper 41b: Spatially-Averaged Models for Large-Scale Gas-Solid Flows — **Simon Schneiderbauer**

8:51 Paper 41c: Partial Regularisation of the Incompressible $\mu(I)$ -Rheology for Granular Flow — **Thomas Barker**

9:09 Paper 41d: Dynamics and Energetics for a Vertically Stirred Mill: Validation of a Discrete Element Method (DEM) Model Via Positron Emission Particle Tracking (PEPT) — **Domenico D'Araino, Michele Marigo Sr., E. Hugh Stitt**

9:27 Paper 41e: Structural and Mechanical Characterization of the Calendaring Process of Lithium-Ion Electrodes Via Discrete Element Method Simulations — **Clara Sangrós Giménez, Arno Kwade, Carsten Schilde**

(42) Advances in Particle Engineering for Pharmaceutical Applications I

Tuesday, Apr 24, 8:15 AM

Marriott, Crystal M

Ecevit Bilgili, Chair

Chi-Hwa Wang, Co-Chair

Sponsored by: Applications of Particle Technology for Pharmaceuticals

8:15 Paper 42a: On Designing Functional Microparticles for Encapsulation and Controlled Release — **Cordelia Selomulya**

8:45 Paper 42b: Improving Content Uniformity of Drug-Loaded Filaments for 3D Printing Via Particle Engineering — **Meng Li, Guluzar Buyukgoz, Ecevit Bilgili, Rajesh Dave**

9:05 Paper 42c: Spray Dried Submicron Sized Particles for Pharmaceutical Application — **Ramona Strob, Gerhard Schaldach, Peter Walzel, Markus Thommes**

9:25 Paper 42d: Efficient Precipitation of Spray Dried Submicron Particles for Pharmaceutical Applications Using a Two-Stage Electrostatic Precipitator — **Adrian Dobrowolski, Damian Pieloth, Helmut Wiggers, Markus Thommes**

(43) Carbon Capture, Utilization, and Storage and Low-Carbon Energy Conversion I

Tuesday, Apr 24, 8:15 AM

Marriott, Crystal K

Rustom Billimoria, Chair

Benjamin Glasser, Co-Chair

Clay Sutton, Co-Chair

Jennifer Wilcox, Co-Chair

Sponsored by: Applications for Sustainable Energy & Environment

8:15 Paper 43a: Internally Circulating Fluidized-Bed Reactor for Inherent CO₂ Capture Using Chemical Looping Combustion — **Mogahid Osman**, Abdelghafour Zaabout, Schalk Cloete, Shahriar Amini

8:45 Paper 43b: Single-Step Conversion of Methane to Liquid Hydrocarbon Fuels with a Layered Composite Catalyst — **Xianhui Zhao**, Ummuhan Cimenler, David Weber, Babu Joseph, John Kuhn

9:15 Paper 43c: Earth Abundant Perovskite Oxides for Low Temperature CO₂ Conversion — **Debtanu Maiti**, Bryan J. Hare, Yolanda Daza, Adela E. Ramos, Venkat R. Bhethanabotla, John N. Kuhn

(44) Flow Properties of Particulate Solids I

Tuesday, Apr 24, 8:15 AM

Marriott, Crystal A
Tim Freeman, Co-Chair
Diego Barletta, Co-Chair
Sponsored by: Particle & Bulk Powder Characterization

8:15 Paper 44a: Flowability Assessment of Weakly Consolidated Powders — **Alexandros Georgios Stavrou**

8:30 Paper 44b: Flowability of Dry Spent Coffee Ground (SCG) Powders — **L. M. Sousa**, M. C. Ferreira

8:45 Paper 44c: Effect of Particle Size and Cohesion on Powder Yielding and Flow — **Hao Shi**, Rahul Mohanty, Somik Chakravarty, Ramon Cabisco, Martin Morgeneyer, Harald Zetzener, Jin Ooi, Arno Kwade, **Stefan Luding**, Vanessa Magnanimo

9:00 Paper 44d: Industrially Relevant Powder Characterisation Using a Uniaxial Powder Tester — **Jamie Clayton**, Tim Freeman, John Yin, Laura Monington, Katrina Brockbank

9:15 Paper 44e: Effect of Particle Properties on Evaluation of Flowability Using a Test of Powder Discharge By Air Pressure — **Koichiro Ogata**

9:30 Paper 44f: Characterising Flow Behavior of Wet Powder in Horizontal Rotating Cylinder — **Amjad Shaikh**

(45) Industrial Applications of Fluidized Beds and Fluidization of Fine Particles (Invited Talk)

Tuesday, Apr 24, 8:15 AM

Marriott, Crystal F
Raj Singh, Chair
Fanxing Li, Co-Chair
Sponsored by: Fluidization & Multiphase Flow

8:15 Paper 45a: Improving Circulating Dehydrogenation Technology through Optimization of Fluidization — **Mayank Kashyap**, T. V. Malleswara Rao, Christian Okolo, Sreekanth Pannala, Viktoria Bast, Sami Muteib Al-Mutairi

8:37 Paper 45b: Hydrodynamic Characteristics of High Pressure High Temperature Counter-Current Moving Bed Chemical Looping System Circulated with Geldart Group D Oxygen Carrier Particles — **Dawei Wang**, Andrew Tong, L.-S. Fan

8:54 Paper 45c: Defluidization Behaviour of Industrial Reactive Powders at High Temperature — **Domenico Macri**, Stephen Sutcliffe, Paola Lettieri

9:11 Paper 45d: Hydrodynamics Behavior of a Gas-Solid System in an Industrial Scale CATOFIN® Dehydrogenation Reactor — **Faysal Benaskar**, Sami Muteib Al-Mutairi

9:28 Paper 45e: Fluidization of Cohesive Materials Using Modified Solids Mechanics Models — **Kerry Johanson**

(46) Interface Controlled Processes I

Tuesday, Apr 24, 8:15 AM

Marriott, Crystal D
Doris Segets, Chair
Shuji Matsusaka, Co-Chair
Sponsored by: Particle Interactions

8:15 Paper 46a: Dispersion of Magnetite Nanoparticles in

Brine Solutions Via Coating with Sulfonated Phenolic Resin — **Yongtae Park**, Heechan Cho

8:35 Paper 46b: Dispersibility of Carbon Black As Function of Dispersing Intensity Using Hansen Dispersibility Parameters – Evaluation of Nonideal Mixing Effects Based on Normalized Relative Sedimentation Time — **Titus Sobisch**, **Dietmar Lerche**, Doris Segets, Sebastian Süß, Wolfgang Peukert

8:55 Paper 46c: The Role of Surfactant Structures at the Metal/Electrolyte Interface for Corrosion Inhibition — **Akshay Rajopadhye**

9:15 Paper 46d: Particulate and Surfactant Systems for Industrial Applications: Challenges and Opportunities — **Brij M. Moudgil**

(47) Multi-Phase Granular Systems - Handling and Processing

Tuesday, Apr 24, 8:15 AM

Marriott, Crystal C
Joerg Theuerkauf, Chair
Chandana Ratnayake, Co-Chair
Sponsored by: Handling & Processing of Granular Systems

8:15 Break

8:37 Paper 47b: CFD-DEM Study on Macro- and Microscopic Behavior of Binary Mixtures of Spheres Under Air Impact — **Dazhao Gou**, Xizhong An, Hao Zhang

8:59 Paper 47c: CFD-DEM Study of Flow Field and Pressure Drop inside a Degassing Silo — **Robert Hesse**, Oleg Urazmetov, Sergiy Antonyuk, Hans Schneider

9:21 Paper 47d: Granular Drainage from a Narrow Rectangular Conduit — **Ritwik Maiti**, **Gargi Das**, Prasanta Kumar Das

(48) Particle and Nanoparticle Functionalization for Energy Applications I

Tuesday, Apr 24, 8:15 AM

Marriott, Crystal N
Yangchuan Xing, Chair

Xinhua Liang, Co-Chair
Karen J. Buechler, Co-Chair
Sponsored by: Particle & Nanoparticle Functionalization

8:15 Paper 48a: Novel Sol-Gel Method of Co-Doped Cerium Gadolinium Oxide Nanoparticles for Solid Oxide Fuel Cell Electrolyte — **Sri Rahayu**, Mojtaba Ghadiri, Girish Kale

8:35 Paper 48b: Preparation of Two Dimensional (2D) MnO₂ By Stirred Media Milling and Its Application in a Supercapacitor — **Chetan Patel**, Vijaykumar Singh

8:55 Break

9:25 Paper 48c: Increasing Durability of Fuel Cell Catalysts with Atomic Layer Deposition — **William McNery IV**, Audrey Linico, Alex Roman, Katherine Hurst, Shaun M. Alia, Chilan Ngo, Jason Zack, J. Will Medlin, Svitlana Pylypenko, Bryan S. Pivovar, Alan W. Weimer

(49) Particle Size/Shape Control

Tuesday, Apr 24, 8:15 AM

Marriott, Crystal P
Reinhard Kohlus, Chair
Sponsored by: Applications of Solids Processing Unit Operations

8:15 Paper 49a: Dry Fine Grinding: Aspects of Particle Stabilization in Mill Classifier Circuit — **Paul Prziwara**, Sandra Breitung-Faes, Arno Kwade

8:37 Paper 49b: Influence of Filtration on Particle Size and Shape of Crystalline Material — **Lisa Loebnitz**, **Hermann Nirschl**

8:59 Paper 49c: Prediction of Granule Critical Quality Attributes Using Twin Screw Granulation — **Shankali U. Pradhan**, Jiayu Li, Carl Wassgren

9:21 Paper 49d: Parallel GPU-Based Monte Carlo Techniques for the Flowsheet Simulation of Solid Processes — **Gregor Kotalczyk**, Ivan Skenderovic, Einar Kruiis

TECHNICAL SESSIONS

(50) Recent Advances in Dust Control and Safety

Tuesday, Apr 24, 8:15 AM

Marriott, Crystal B
Alvaro Ramirez Gomez, Chair
Eddie McGee, Co-Chair
Sponsored by: Handling & Processing of Granular Systems

8:15 Break

8:37 Paper 50a: Evaluation of the Concentrated Spatial Dust Distribution in Cylindrical Silo during the Filling Process for Predicting Dust Explosion Hazards — *Lahiru Lakshan Lulbadda Waduge, Luke Stone, Pablo Garcia Triñanes, Stefan Zigan*

8:59 Paper 50b: Precursor Materials Containing Asbestos Characterization and Monitoring for Asbestos Dust Impact Prevention — *Giuseppe Bonifazi, Silvia Serranti*

9:21 Paper 50c: Optimization and Round Robin Testing of the Heubach Type I Dustiness Meter for Use in Determining Dustiness and Dust Levels of Enzyme Granules and Powders — *Gabrie Meesters*

(51) Recent Developments in the Characterization of Pharmaceutical Materials I

Tuesday, Apr 24, 8:15 AM

Marriott, Crystal L
Chi-Hwa Wang, Chair
Satoru Watano, Co-Chair
Mario Hubert, Co-Chair
Sponsored by: Applications of Particle Technology for Pharmaceuticals

8:15 Paper 51a: The Compression and Compaction Behaviour of Pharmaceutical Powders and Their Binary Mixtures — *Isabell Wünsch, Jan Henrik Finke, Edgar John, Michael Juhnke, Arno Kwade*

8:38 Paper 51b: Tablet Disintegration: Advanced Methodology Development — *Jakub Dvorak, Denisa Lizonova, Jan Tomas, Marek Schongut, Frantisek Stepanek, Josef Beranek, Ondrej Dammer*

9:01 Paper 51c: Tablet Coating By Injection Molding Technology: Characterization of Coating Materials for Optimal Process and Product Performance — *Parind Desai, Vibha Puri, David Brancazio, Bhakti Halkude, Jeremy Hartman, Aniket Wahane, Alex Martinez, Keith Jensen, Eranda Harinath, Richard Braatz, Jung-Hoon Chun, Bernhardt L. Trout*

9:23 Paper 51d: Quantification of Lubrication and Particle Size Distribution Effects on Tensile Strength and Stiffness of Tablets — *Sonia M. Razavi, Marcial Gonzalez, Alberto Cuitino*

(52) EMMS Workshop (Ticketed Event)

Tuesday, Apr 24, 9:00 AM

Marriott, Crystal Q
Wei Ge, Chair
Mayank Kashyap, Co-Chair
Wei Wang, Co-Chair
Sponsored by: Education

9:00 Paper 52a: EMMS Modeling for Gas-Solid Systems — *Bona Lu*

10:30 Break

11:00 Paper 52b: EMMS Modeling for Gas-Liquid Systems — *Ning Yang*

12:00 Lunch Break

12:59 Paper 52c: EMMS Workshop — *Wei Wang, Wei Ge*

1:00 Paper 52d: Experimental Measurements of Meso-Scale Phenomena Leading to an Understanding of Interphase Heat and Mass Transfer in CFB Risers — *Ronald W. Breault*

1:20 Paper 52e: The Physical Reality of Particle Drag in CFD Modeling — *Ray Cocco*

1:40 Paper 52f: Instability, Hysteresis, and Mal-Distribution in Two-Phase Parallel Flow Channels — *Xiaotao Bi*

2:00 Paper 52g: Scale-Dependent Nonequilibrium Distributions of Gas-Solid Bubbling Fluidization — *Wei Wang*

2:20 Break

2:50 Paper 52h: Small Scale Experimental and Modeling Study for Geldart Group A Particles — *Tingwen Li*

3:10 Paper 52i: Mesoscale Concept for Turbulence Modelling and Simulation — *Limin Wang*

3:30 Paper 52j: Modelling of DMTD Fluidized Bed Reactors: from Laboratory Scale Reactor to Commercial Reactor — *Mao Ye*

3:50 Paper 52k: Dominant Mechanism and Dynamic Evolution of Mesoscale Structures in a Liquid-Injection Fluidized Bed — *Jingdai Wang*

4:10 Paper 52l: Validation and Exploration of the EMMS Model with Direct Numerical Simulation — *Wei Ge*

4:30 Paper 52m: CFD Simulation of Gas-Solid flows Using EMMS Approach — *Hamid Arastoopour*

4:50 Concluding Remarks

(53) Plenary: Nature-Inspired Chemical Engineering - a Pathway to Innovation in Particle Technology (Invited Talk)

Tuesday, Apr 24, 10:30 AM

Marriott, Crystal G
Ray Cocco, Chair
Sponsored by: 8th World Congress on Particle Technology Plenaries

10:30 Paper 53a: Nature-Inspired Chemical Engineering - a Pathway to Innovation in Particle Technology — *Marc-Olivier Coppens*

(54) World Congress on Particle Technology Poster Session

Tuesday, Apr 24, 11:45 AM

Marriott, Crystal H
Ray Cocco, Chair
Sponsored by: Poster Sessions Particle & Bulk Powder Characterization

Paper 54a: Evaluating the Influence of Dry Granulation Processing Variables on the Rheological Properties of Granules — *Tim Freeman, Laura Monington, John Yin, Hartmut Vom Bey, Michael Hanisch*

Paper 54b: Assessment of the Homogeneity of an Alumina Powders Mixture Using Rheological Parameters — *Martin Giraud, Cendrine Gatamel, Guillaume Bernard-Granger, Henri Berthiaux*

Paper 54c: Characterising the Grain Shape: In Search of Size Independent Shape Descriptors — *Aman Tripathi, Shivi Dixit, Vimod Kumar, Samik Nag, Anurag Tripathi*

Paper 54d: Investigating Mechanical Properties of Surfactant Films at the Solid-Liquid Interface Using AFM — *Anoop Nautiyal*

Paper 54e: Deposition Rate Consequences of the Formation of Multi-Spherule Cluster Aggregates in Gases — Role of Momentum Shielding™ — *Daniel E. Rosner, Pushkar Tandon*

Paper 54f: Experimental and Numerical Studies on the Thermal Diffusivity of Packed Powder Beds — *Bereket Yohannes, Sahil Navodia, Anna Nachtigal, Calvin Kim, Fernando J. Muzzio, William G. Borghard, Benjamin Glasser, Alberto Cuitino*

Paper 54g: Determination of Size, Size Distribution and Refractive Index of Artificial and Biological Microparticles — *Jörg Neukammer, Kathrin Smuda, Jonas Gienger, Hans Bäumlér*

Paper 54h: Modelling Deposition of Powders into a Confined Space — *Ling Zhang, Charley Wu*

Paper 54bm: FlowCam Nano® Provides Counts, Sizes and Images of Nano- and Microparticles: Application to a Therapeutic Protein Pumping Study — *Dave Hamel, Cheng Her, Chris Sieracki, Kent Peterson, Christian Mills, John Carpenter*

Particle Interactions

Paper 54j: Numerical and Experimental Estimation on the Normal and Tangential Capillary Bridge Force Adhered to Two Spheres — **Kazuo Murase**, Keisuke Arai, Takato Ootsuka, Daiki Sakamoto, Futa Egawa

Paper 54k: Numerical Simulation of Wire-Plate Electrostatic Precipitator - Effect of Particle Concentration — **Jun Guo**, **Bao-Yu Guo**, Yin-Biao Su, Aibing Yu

Paper 54l: Triboelectric Charge of Spherical Glass Particles Against Metal Pipeline — **Hosu Choi**, **Kwangseok Choi**, Teruo Suzuki

Particle Design

Paper 54m: Spray-Drying of a Layered Double Hydroxide Nanosuspension — **Boris Golman**, Wittaya Julklang, Aunchana Wangriya

Paper 54n: Impact of Spheroidization of UO₂ Powders on the Filling of Press Molds — **Ahmed Madian**

Handling & Processing of Granular Systems

Paper 54o: Modelling a Twin Screw Granulator Using the Discrete Element Method — **John P. Morrissey**, Kevin J. Hanley, Jin Y. Ooi

Paper 54p: Hybrid Multiscale Modelling of a Twin Screw Granulator — **John P. Morrissey**, Kevin J. Hanley, Jin Y. Ooi, Li Ge Wang, James D. Litster

Paper 54r: Blocking Rules for Discharging Granular Materials from a Flat Bottom Hopper — **Charley Wu**

Paper 54s: Experimental Study of 3D Printed Surface on Granular Mixing in a Rotating Drum — **Vladimir Zivkovic**, Steven Wang

Paper 137b: Characterization of Mesoscopic Structure in Cohesive Powder, Neat or Blended, By

X-Ray Computed Tomography and Prediction By the Discrete Element Method — **Sean McClure**, Andrew Abi-Mansour, Michael Gentzler

Particle & Nanoparticle Functionalization

Particle Classification

Paper 54t: Numerical Research of Hydrodynamics in Gas-Solid Micro Fluidized Beds — **Xu Liu**, Jinglin Su, Jinghui Zhan, Lijie Cui, Xiaoxing Liu

Fluidization & Multiphase Flow

Paper 54u: 3D Modelling of Cardiovascular Stent Implantation Using the DEM — **Marina Sousani Dr.**, Carles Bosch Padros, Richard Wood Dr.

Paper 54v: An Improved Bubble-Based Drag Model for Accurate Coarse-Grid Two-Fluid Modeling of Geldart a Powder Bubbling Fluidization — **Kun Hong**, **Qingang Xiong**, Atta Ullah

Paper 54w: Macrobutton MTEditEquationSection2 Equation Chapter 1 Section 1 SEQ Mteqn \r \h * Mergeformat SEQ Mtsec \r 1 \h * Mergeformat SEQ Mtchap \r 1 \h * Mergeformat numerical Simulation on Fine Particle Transport Behaviour in Electrostatic Precipitators — **Ming Dong**, Fei Zhou, Sufen Li

Paper 54x: Lattice Boltzmann Simulations of Porous Particulate Flows — **Chenggong Li**, Mao Ye, Zhongmin Liu

Paper 54z: Modeling of a Novel Multi-Particle Collision Model for Gas-Solid Flows — **Vikrant Verma**, Johan T. Padding

Paper 54aa: Dpm Analysis of Large Fluidized Catalytic Cracking (FCC) Reactors — **Azita Ahmadzadeh**, Michael Sandacz, Richard Johnson

Paper 54ab: CFD-DEM with Dynamic Meshing – a Novel Approach to Predict Particle Dispersion in an Agitated Tubular Reactor — **Yi He**, Andrew E.

Bayly, Ali Hassanpour, Hugh P. Rice, Timothy N. Hunter, Frans L. Muller, Michael Fairweather

Paper 54ad: Catalytic Reactor Design Using Multiphase CFD — **Dimitri Gidaspow**

Paper 54ae: Simulation of Large Particle Turbulent Fluidization in Riser Reactors By Coarse Grain DEM-CFD — **Alberto Di Renzo**, Francesco P. Di Maio

Paper 54af: Numerical Study of Particles Shape Effects on Solid-Liquid Fluidizations — **Esmail Abbaszadeh Molaei**, **Zongyan Zhou**

Paper 54ag: Bubbling Behavior Under Mechanical Bed Vibrating Condition in a Gas-Solid Fluidized Bed — **Yoshihide Mawatari**

Paper 54ah: The Effect of Pressure on Hydrodynamic Characteristics in Dense Fluidized Bed and Riser — **Zhonghu Cheng**, Yitian Fang, **Junguo Li**

Paper 54ai: CFD Investigation on Gas-Solids Flow and Heat Transfer in Two Fluidized Catalyst Cooler — **Xiuying Yao**, Chunxi Lu

Paper 54aj: Hydrodynamics and Mixing Characteristics of a New-Type Particle Mixer — **Mengxi Liu**, Chunxi Lu, Zhenliang Meng

Paper 54ak: Power Spectral Density Analysis of Pressure Signal in 18 m Circulation Fluidized Bed Riser — **Chengxiu Wang**, Chaoyu Yan, Yaodong Wei, Jinsen Gao, Chunming Xu, Huajian Pei, Xin Su

Paper 54al: Characteristics of Pressure Fluctuations in Particle-Transport Inclined Pipe of a Circulating Fluidized Bed — **Chaoyu Yan**, Yaodong Wei, Jianfei Song, Jianguyun Wang

Paper 54am: Dynamic Modeling of Attrition and Reactions in Circulating Fluidized Bed Reactors — **Johannes Haus**, Ernst-Ulrich Hartge, Joachim Werther, **Stefan Heinrich**

Paper 54an: Analysis of FCC Cyclone Fault Diagnosis Technology Based on Particles Information — **Jianfei Song**, Di Wang, Liqiang Sun, Chaoyu Yan, Yaodong Wei

Paper 54ao: The Multi-Hole Throttling Effect and the Erosion Characteristics of the High Pressure Natural Gas — **Jianguyun Wang**, Linqian Hou, Jing Lv, Yaodong Wei, Chaoyu Yan

Paper 54ap: Numerical Simulation of Flow Field In a Gas Pipe Distributor of the FCCU Regenerator — **Yaodong Wei**, Jianfei Song, Chaoyu Yan

Paper 54aq: Full-Loop Simulation of Gas-solids Flow in Circulating Fluidized Bed of FCC System — **Xingying Lan**, Min Wang, Yingya Wu, Jinsen Gao

Applications for Sustainable Energy & Environment

Paper 54ar: Immobilization of Sulfur-Oxidizing Bacterium, Thioalkalivibrio Sp. D301 on Magnetic Nanaoparticles and Biondesulfurization — **Jianmin Xing**

Paper 54as: Simulation of Bulk Solids and Granular Systems By Using Combined Discrete Element Models — **Yongzhi Zhao**

Paper 54bk: Material Optimization of Perovskite Films using High Throughput Synthesis and Multi-Dimensional Analysis — **Ahmed M. Salaheldin**, Erich R. Reinhardt, Monica Distaso, Doris Segets, Wolfgang Peukert

Particle-Based Separations: Fundamentals & Applications

Paper 54au: Solid Liquid Separation Via Particle Flow Instability — **Steven Wang**

Applications of Particle Technology for Pharmaceuticals

Paper 54av: 3D Modelling of Cardiovascular Stent Implantation and Vessel Deformation Using

TECHNICAL SESSIONS

the DEM — **Dr Marina Sousani, Carles Bosch Padros**

Paper 54aw: Milling and Grindability Assessment of Pharmaceutical Materials — **Tina Bonakdar, Mojtaba Ghadiri, Ali Hassanpour, Kevin J. Roberts**

Applications of Solids Processing Unit Operations

Paper 54ax: Bi-Directional Thermal Control of Twin Screw Granulation Process Via a Specialised Annular Heat Pipe — **Ahmad Mustaffar, Kamelia Boodhoo, Anh Phan**

Paper 54ay: Mixing Grains with Different Elongation in a Rotating Drum — **Claudia Piacenza, Marco Marconati, Colin Hare, Andrea Santomaso, Marco Ramaoli**

Paper 54az: Generation of Particles with a Special Morphology By Desublimation of Copper Phthalocyanine — **Tim Dillenburger, Sergiy Antonyuk**

Paper 54bl: Rubbery Milling of Seed Endosperms for Improved Sustainability by Natural Functionality Preservation — **Linda Brütsch, Erich J. Windhab, V. Meunier**

Special Topics in Particle Technology

Education

Paper 54ba: Particle Technology Education at Purdue University — **Carl Wassgren**

Paper 54bb: Teaching Particle Technology in Portugal – University of Coimbra — **Maria G. Rasteiro**

Paper 54bc: Highlights of Particle Technology Teaching in Singapore — **Cindy Lai Yeng Lee, Eldin Wee Chuan Lim, Jia Wei Chew**

Paper 54bd: Particle Technology Course at the University of Salerno — **Diego Barletta, Massimo Poletto**

Paper 54be: Professional Master of Engineering Degree in Particle Technology — **R. Bertrum Diemer Jr., James N. Michaels**

Paper 54bf: Recent Developments in Particle Technology at the Universidad Tecnica Federico Santa Maria — **Francisco Cabrejos**

Paper 54bg: Using Perusall to Enhance Student Learning of Particle Technology at Graz University of Technology — **Daniel Lepek, Stefan Radl, Johannes G. Khinast**

Paper 54bh: A Graduate Course in Fluidization and Gas-Solid Flow Systems — **Hamid Arastoopour, Ted Knowlton**

Paper 54bi: Education of Fluid-Solid Multiphase Flow at Department of Mechanical Engineering, Osaka University — **Toshitsugu Tanaka**

Paper 54bj: Bulk Solids Handling Education at the KSU Bulk Solids Innovation Center — **Johnselvakumar Lawrence**

(55) Advances in Attrition, Erosion and Wear

Tuesday, Apr 24, 1:30 PM

Marriott, Crystal C
Diego Barletta, Co-Chair
Sponsored by: Handling & Processing of Granular Systems

1:30 Paper 55a: Structure Induced Breakage — **Kerry Johanson**

1:48 Paper 55b: Erosion Prediction of Process Equipment Using CFD-DEM Simulation — **Lei Xu, Yongzhi Zhao**

2:06 Paper 55c: Investigation of Erosion-Corrosion Behavior of 304 Stainless Steel Under Solid-Liquid Jet Flow Impinging at 30° — **Yanlin Zhao, Zihua Zeng, Jun Yao**

2:24 Paper 55d: Influence of Swirl Flow on the Erosion of Pipe Bends of Pneumatic Conveying Pipeline Systems — **Rajeshwar Verma**

2:42 Paper 55e: A Simple Model to Account Particle Breakage in Pneumatic Conveying — **Dmitry Portnikov, Nir Santo, Haim Kalman**

(56) Advances in Particle Engineering for Pharmaceutical Applications II

Tuesday, Apr 24, 1:30 PM

Marriott, Crystal M
Rajesh Davé, Chair
Chi-Hwa Wang, Co-Chair
Sponsored by: Applications of Particle Technology for Pharmaceuticals

1:30 Paper 56a: A Rational Single Particle Design Approach Using an Acoustic Levitation System and X-Ray Tomography — **Frederik Doerr, Iain D.H. Oswald, Alastair J. Florence**

2:00 Paper 56b: Effect of Casting Techniques on Critical Quality Attributes of Strip-Films — **Rajesh Davé, Ecevit Bilgili, Lu Zhang, Eylul Cetindag, John Pentangelo**

2:20 Paper 56c: Experimental Studies on the Effect of Moisture Content and Volume Resistivity on Electrostatic Behaviour of Pharmaceutical Powders — **Kwangseok Choi, Milad Taghavivand, Lifeng Zhang**

2:40 Paper 56d: Formation of Gradient Particle Pattern Via Electric Field Guided Electrospray Deposition — **Wei-Cheng Yan, Jingwei Xie, Chi-Hwa Wang**

(57) Applications Keynote II: Dynamic Solids Flowsheeting (Invited Talk)

Tuesday, Apr 24, 1:30 PM

Marriott, Crystal P
Sergiy Antonyuk, Chair
Sponsored by: Applications of Solids Processing Unit Operations

1:30 Paper 57a: Dynamic Simulation of Interconnected Solids Processes — **Vasyi Skorych, Maksym Dosta, Ernst-Ulrich Hartge, Stefan Heinrich**

2:15 Paper 57b: Short-Cut Models for Precipitation

in Flowsheet Simulation: Experimental and Numerical Investigation of a Two-Zone Model for Stirred Tank Reactors — **Hendrik Rehage, Matthias Kind**

2:35 Paper 57c: Simulation of Powder Segregation Phenomena during Filling and Emptying of an Industrial Storage Hopper — **John P. Hecht, Vidya Vidyapati, Jianfeng Li, Mark Pinto**

(58) Flow Properties of Particulate Solids II

Tuesday, Apr 24, 1:30 PM

Marriott, Crystal A
Poupak Mehrani, Chair
Quentin Ribeyre, Co-Chair
Sponsored by: Particle & Bulk Powder Characterization

1:30 Paper 58a: Estimates of Powder Flow Properties at Low Consolidation from the Torque Measured in a Powder Rheometer Equipped with a Cylindrical Impeller — **Marco Lupo, Denis Schütz, Elke Riedl, Diego Barletta, Massimo Poletto**

1:45 Paper 58b: Predicting Process Performance in Screw Feeders Using Powder Flow Measurements — **Tim Freeman, John Yin, Laura Monington, Daniel Buechi, Tobias Weber, Ralf Weinekotter**

2:00 Paper 58c: Using a Freeman FT4 Rheometer and Electrical Capacitance Tomography to Assess Powder Blending — **Michele Marigo Sr., Giuseppe Forte, Peter Clark, Edmund Steitt, Zilin Yan**

2:15 Paper 58d: The Use of Modern Rheometers in Powder and Granular Media Measurements for Scientific and Industrial Purposes — **Denis Schütz, Abhishek Shetty, Katja Hartmann, Elke Riedl**

2:30 Paper 58e: Flow Assessments of Selective Laser Sintering Powders Via Fluidized Bed Rheology on a Rotational Rheometer — **Abhishek Shetty, Denis Schütz**

2:45 Paper 58f: A Surface Characterization Platform Approach to Study Food Powder Flowability — **Edgar Chávez-Montes, Jean-Claude Gummy, M. Teresa Carvajal**

(59) Interface Controlled Processes II

Tuesday, Apr 24, 1:30 PM

Marriott, Crystal D
Jochen Schmidt, Chair
Shuji Matsusaka, Co-Chair
Sponsored by: Particle Interactions

1:30 Paper 59a: Structure of Spherical Silica Colloid Film Prepared By Electrophoretic Deposition in Pulsed Direct Current Electric Field — **Yasushige Mori, Yoshiro Sadakami, Ken Nishimura, Katsumi Tsuchiya**

1:50 Paper 59b: Dynamic Wetting of Multicomponent Particle Systems — **Jana Kammerhofer, Lennart Fries, Julien Dupas, Laurent Forny, Stefan Heinrich, Stefan Palzer**

2:10 Paper 59c: Aspects of Wettability Heterogeneities in Flotation - Investigations with Inverse Gas Chromatography and Colloidal Probe Atomic Force Microscopy — **Martin Rudolph, Bent Babel, Paul Knüpfer, Urs A. Peuker**

2:30 Paper 59d: Surface Engineering for Designing Superhydrophobic and Superhydrophilic Particulate Solids — **Deepa Dixit, Chinmay Ghoroi**

(60) Introduction to Computational Modeling

Tuesday, Apr 24, 1:30 PM

Marriott, Crystal J2
James M. Parker, Chair
Peter Blaser, Co-Chair
Oleh Baran, Co-Chair
Sponsored by: Education

1:30 Introductory Remarks

1:35 Paper 60a: Introduction to Computational Modeling for Particle Technology — **Mayank Kashyap**

1:55 Paper 60b: Introduction to 3D Models — **Mayank Kashyap**

2:15 Paper 60c: Application Example #1 — **Mayank Kashyap**

2:35 Paper 60d: Application Example #2 — **Mayank Kashyap**

2:55 Concluding Remarks

(61) Liquid-Solid and Gas-Liquid-Solid Fluidized Beds

Tuesday, Apr 24, 1:30 PM

Marriott, Crystal F
Shyam Sundaram, Chair
Aaron Morris, Co-Chair
Sponsored by: Fluidization & Multiphase Flow

1:30 Paper 61a: Experimental and Modeling Investigation of Sand Dune and Sand Bed Transition — **Ramin Dabirian, Ilias Gavrielatos, Ram S. Mohan, Ovidia Shoham**

1:45 Break

2:00 Paper 61c: A Meso-Scale Flow Model of Gas-Liquid-Solid Fluidized Beds with Acceleration Items — **Yongli Ma**

2:15 Paper 61d: Flow Regimes in Gas-Liquid-Solid Mini-Fluidized Beds with Single Gas Orifice — **Mingyan Liu Sr., Yanjun Li Sr., Xiangnan Li Sr.**

2:30 Paper 61e: Systematic Investigation of Segregated Layer Inversion in Liquid-Fluidized Binary Beds — **Alberto Di Renzo, Francesco P. Di Maio**

2:45 Paper 61f: Calculation of Granular Pressure By CFD-DEM Approach and Application to Stability Analysis in Solid-Liquid Fluidized Beds — **Linhan GE, Roberto Moreno-Atanasio, Geoffrey M. Evans**

(62) Measurement Techniques I

Tuesday, Apr 24, 1:30 PM

Marriott, Crystal E
Ted Knowlton, Chair
Jia Wei Chew, Co-Chair

Sponsored by: Fluidization & Multiphase Flow

1:30 Paper 62a: Intrusive Probes in Riser Applications — **Ray Cocco, S. B. Reddy Karri, Ted Knowlton, John Findlay, Thierry Gauthier, Jia Wei Chew, Christine Hrenya**

2:00 Paper 62b: Detection of Fluidization with Real-Time Magnetic Resonance Imaging — **Alexander Penn, Christopher M. Boyce, Klaas P. Pruessmann, Christoph R. Müller**

2:20 Paper 62c: Solids Mixing Studies in Fluidized Beds Using Fluorescent Tracer Technique — **Shyam Sundaram, S. B. Reddy Karri, Ray Cocco, Ted Knowlton**

2:40 Paper 62d: Stereoscopic PIV Study on Swirl Phenomena in Uniflow Cyclones — **Martin Pillei, Tobias Kofler, Michael Kraxner**

(63) Particle and Nanoparticle Functionalization Keynote (Invited Talk)

Tuesday, Apr 24, 1:30 PM

Marriott, Crystal J1
Alan W. Weimer, Chair
Sponsored by: Particle & Nanoparticle Functionalization

1:30 Paper 63a: Atomic Layer Deposition for the Synthesis of Nanostructured Catalysts — **Jeffrey Elam**

2:15 Paper 63b: The R & D on Engineered Particles for Functional Materials in China — **Guo-Sheng Gai**

(64) Recent Developments in the Characterization of Pharmaceutical Materials II

Tuesday, Apr 24, 1:30 PM

Marriott, Crystal L
Chi-Hwa Wang, Chair
Satoru Watano, Co-Chair
Mario Hubert, Co-Chair
Sponsored by: Applications of Particle Technology for Pharmaceuticals

1:30 Paper 64a: Relative Importance of Cohesion and Internal Friction in Flowability of

Pharmaceutical Powder — **Lap Yin (Henry) Leung, Chen Mao**

1:53 Paper 64b: Evaluation of Mechanical Properties of Organic Crystals for the Prediction of Breakage during Isolation Processes — **François S. Hallac, Ioannis S. Fragkopoulos, Simon D. Connell, Frans L. Muller**

2:16 Paper 64c: Characterization of Paracetamol Granules Formed By Binder Dropping — **Sheena Reeves, Adetutu Martins**

2:38 Paper 64d: Investigation of Single-Droplet Drying Kinetics in an Acoustic Levitator, Micro-Sphere Morphology and Mechanical Properties of Pharmaceutical Excipients — **Manuel Kreimer, Isabella Aigner, Stephan Sacher, Markus Krumme, Thomas Mannschott, Peter van der Wel, Albert Kaptein, Hartmuth Schröttner, Günter Brenn, Johannes G. Khinast**

(65) Segregation and Mixing - Modeling, Simulations and Applications I

Tuesday, Apr 24, 1:30 PM

Marriott, Crystal B
Stefan Luding, Chair
Francisco J. Cabrejos, Co-Chair
Sponsored by: Handling & Processing of Granular Systems

1:30 Paper 65a: Applying Particle-Size Segregation Theory to the Erosion-Deposition Dynamics of Granular Avalanches — **Andrew Edwards, Nico Gray**

1:50 Paper 65b: Radial Segregation of Binary-Sized Mixture of Ellipsoids in a Rotating Drum — **Siyuan He, Jieqing Gan, David Pinson, Zongyan Zhou**

2:10 Paper 65c: Analysis of Mixing Dynamics of Powders in a Nauta Mixer Using DEM Simulation — **Haithem Louati, Xavier Bednarek, Sylvain Martin, Ndiaye Abidatou, Olivier Bonnefoy**

2:30 Paper 65d: Continuum Analysis of DEM Simulations of Mixing Processes — **Alvaro Janda, Carlos Labra**

2:50 Discussion

(66) Separations with Surface Active Particles

Tuesday, Apr 24, 1:30 PM

Marriott, Crystal N
Susanne Wolff, Chair
Fanxing Li, Co-Chair
Sponsored by: Particle-Based Separations: Fundamentals & Applications

1:30 Introductory Remarks

1:35 Paper 66a: Second Dose during the Breakage Occurred in Initial Flocculation Phase: Does It Work Positively? — **Zhaoyang Su Sr., Xing Li Sr., Yanling Yang Sr.**

1:55 Paper 66b: Effect of Particle Wettability on Mineral Oil-Distilled Water Emulsion Stability — **Cristian Nunez, Ramin Dabirian, Ilias Gavrielatos, Ram S. Mohan, Ovadia Shoham**

2:15 Paper 66c: Effect of Oil Filtration on Oil-Water Dispersion Characterization — **Ramin Dabirian, Cristian Nunez, Ilias Gavrielatos, Ram S. Mohan, Ovadia Shoham**

2:35 Concluding Remarks

(67) Applications for Sustainable Energy & Environment Keynote (Invited Talks)

Tuesday, Apr 24, 1:30 PM

Marriott, Crystal K
Eric B. Shen, Chair
Ah-Hyung Alissa Park, Co-Chair
Sponsored by: Applications for Sustainable Energy & Environment

1:30 Paper 67a: Creating a Pathway to Sustainability: The Critical Contribution of Particle Technology Research — **Hamid Arastoopour**

2:15 Paper 67b: Energy Outlook, A View to 2040 — **Rustom Billimoria**

3:00 Paper 67c: Chemical Looping Combustion, Gasification and Reforming – Particle Technology Perspectives — **L.-S. Fan**

(68) Advances in Particle Engineering for Pharmaceutical Applications III

Tuesday, Apr 24, 3:30 PM

Marriott, Crystal M
Chi-Hwa Wang, Chair
Ecevit Bilgili, Co-Chair
Sponsored by: Applications of Particle Technology for Pharmaceuticals

3:30 Paper 68a: Enabling Direct Compaction at High Drug Loading Via Dry Coating of APIs: Towards a Predictive Framework — **Rajesh Davé, Kuriakose Kunnath**

4:00 Paper 68b: Particle Engineering at the Drug Substance, Drug Product Interface – Inherently Continuous Processes Yielding Advantageous Material Properties — **Luke Schenck, Athanas Koynov, Robert O'Connor, Aaron Cote**

4:20 Paper 68c: The Role of Surface Energy on Developing Engineered Excipients during Dry Coating Process — **Liang Chen, Rajesh Davé**

4:40 Paper 68d: A Mechanistic Approach to Developing Spherical Agglomeration for Process Intensification in Pharmaceutical Manufacturing — **Jonathan D Tew, Omid Arjmandi-Tash, Kate Pitt, Rachel Smith, James D. Litster**

(69) Flow Properties of Particulate Solids III

Tuesday, Apr 24, 3:30 PM

Marriott, Crystal A
Aibing Yu, Chair
Denis Schütz, Co-Chair
Sponsored by: Particle & Bulk Powder Characterization

3:30 Paper 69a: Optimising High Shear Wet Granulation with the Combined Use of in-Line and at-Line Testing — **Tim Freeman, John Yin, Laura Monington, Ajit Narang, Valery Sheverev, Douglas Both, Vadim Stapaniuk, Kevin Macias, Ganeshkumar Subramanian**

3:45 Paper 69b: Determine the Flow Properties of Bulk Materials to Prevent Flow Problems — **Francisco Cabrejos**

4:00 Paper 69c: Discrete Element Method (DEM) Investigation of Particle Properties on Bulk Powder Flowability: Toward a Particle Calibration Library for Pharmaceutical Materials — **William R. Ketterhagen, Brian Shoemaker, Stephen Cole, David Curry**

4:15 Paper 69d: The Effects of Particle Size Distribution and Moisture on the Flowability of Fibrous and Woody Biomass — **Spandana Vajrala, Heather N. Emady**

4:30 Paper 69e: Discrete Element Method (DEM) Modeling to Study the Effects of Particle Size and Shape on Flowability: Toward More Realistic Representations of Actual Powders — **Rohit Kumar, Avik Sarkar, William R. Ketterhagen**

4:45 Paper 69f: Linking Particle Properties to Powder Performance in the Process Plant — **Pablo Garcia Triñanes, Rob Berry, Mike Bradley**

(70) Flow Structures in Risers, Downers, and Bubbling Fluidized Beds (Invited Talk)

Tuesday, Apr 24, 3:30 PM

Marriott, Crystal F
Zhe Cui, Chair
Kalyn Froeschle, Co-Chair
Sponsored by: Fluidization & Multiphase Flow

3:30 Paper 70a: Riser Dynamics – a Comparison of Scale — **Ronald W. Breault, Nicholas Hillen, Steven Rowan, Justin Weber**

3:52 Paper 70b: Detailed Numerical Simulation of a Full-Loop Circulating Fluidized Bed Under Different Operating Conditions — **Yupeng Xu, Jordan Musser, Tingwen Li, William A. Rogers**

4:09 Paper 70c: Generating Macroscopic Quantities of Particle-Fluid Flows of Coarse Particles By an Averaging Method: Selection of Sample Sizes and Test of Solid Pressure Correlation — **Qinfu Hou**

4:26 Paper 70d: Structured Flow in Gas-Solid Fluidized Beds: Particle Clustering and Bubble Self-Organisation — **Victor Francia, Kaiqiao Wu, Marc-Olivier Coppens**

4:43 Paper 70e: Studies on the Mechanism and Regulation-Control Method of a High Density Gas-Solids Circulating Fluidized Bed Downer — **Chengxiu Wang, Lan Xingying, Gao Jinsen, Jesse Zhu**

(71) Interface Controlled Processes III

Tuesday, Apr 24, 3:30 PM

Marriott, Crystal D
Jochen Schmidt, Chair
Shuji Matsusaka, Co-Chair
Sponsored by: Particle Interactions

3:30 Paper 71a: The Influence of Nanobubbles on the Interaction Forces between Alumina Particles and Ceramic Foam Filters in Water — **Lisa Ditscherlein, Urs A. Peuker**

3:50 Paper 71b: Effect of Physical Properties of Coal Gasification Fine Ash on Its Wettability — **Xueli Chen, Lin Xu, Shijie Zhu, Haifeng Lu**

4:10 Paper 71c: Analysis and Control of Adhesion Behavior of Sewage Sludge Combustion Ashes at High Temperature — **Juguan Gao, Miki Matsushita, Hidehiro Kamiya, Mayumi Tsukada**

4:30 Paper 71d: Mixed Layer Formation in a Blast Furnace and Its Effect on the Performance — **Dianyu E, Qinfu Hou, Aibing Yu**

(72) Measurement Techniques II

Tuesday, Apr 24, 3:30 PM

Marriott, Crystal E
Ted Knowlton, Chair
Poupak Mehrani, Co-Chair
Sponsored by: Fluidization & Multiphase Flow

3:30 Paper 72a: Measurement and Imaging of Gas-Solid Systems Using Electrical Capacitance Volume Tomography — **Qussai Marshdeh, Benjamin Straiton, Andrew Tong, Liang-Shih Fan**

4:00 Paper 72b: Material Distribution of Gas-Solid Fluidized Beds Measured By Electrical Capacitance Tomography – a Big-Data Perspective — **Mao Ye, Qiang Guo, Shuanghe Meng, Wu Qiang Yang, Zhongmin Liu**

4:20 Paper 72c: Heat Transfer in a Pressurized Fluidized Bed with Continuous Addition of Fines — **Fang Li, Eric Mielke, Ali Dergham, Arturo Macchi, Poupak Mehrani**

4:40 Paper 72d: Investigation of the Effect of Fluidization on Alkane Catalytic Cracking in Fluidized Bed Reactor By High Temperature ECT Measurement System — **Yinfeng Zhao, Qiang Guo, Shuanghe Meng, Wuqiang Yang, Mao Ye, Zhongmin Liu**

(73) Nature-Inspired Chemical Engineering Applied to Particle Technology

Tuesday, Apr 24, 3:30 PM
Marriott, Crystal J2
Marc-Olivier Coppens, Chair
Daniel Lepek, Co-Chair
Sponsored by: Education

3:30 Paper 73a: Nature-Inspired Chemical Engineering Applied to Particle Technology — **Marc-Olivier Coppens, Daniel Lepek**

(74) Particle and Nanoparticle Functionalization for Catalysis

Tuesday, Apr 24, 3:30 PM
Marriott, Crystal J1
J. Ruud van Ommen, Chair
Yangchuan Xing, Co-Chair
Sponsored by: Particle & Nanoparticle Functionalization

3:30 Paper 74a: Atomic Layer Deposited Nickel Nanoparticle Catalysts for Dry Reforming of Methane (Invited) — **Zeyu Shang, Xinhua Liang**

4:00 Paper 74b: Extended Surface Electrocatalysts Synthesized Via Atomic Layer Deposition — **William McNearney IV, Audrey Linico, Alex Roman, Katherine Hurst, Shaun M. Alia, Chilan Ngo, Jason Zack, J. Will**

Medlin, Svitlana Pylypenko, Bryan S. Pivovar, Alan W. Weimer

4:20 Paper 74c: Scalable Manufacturing of Nanostructured Noble-Metal Catalysts Using Atomic Layer Deposition — **J. Ruud van Ommen, Fabio Grillo, Hao Bui, Jacob A. Moulijn, Michiel Kreutzer**

4:40 Paper 74d: Flame-Made TiO₂(B) — **Keroles B. Riad, Paula M. Wood-Adams, Karsten Wegner**

(75) Particle and Nanoparticle Functionalization for Energy Applications II

Tuesday, Apr 24, 3:30 PM
Marriott, Crystal N
Yangchuan Xing, Chair
Xinhua Liang, Co-Chair
Karen J. Buechler, Co-Chair
Sponsored by: Particle & Nanoparticle Functionalization

3:30 Paper 75a: Dopant Modified Iron Based Oxygen Carriers for Chemical Looping Combustion and Gasification Applications (Invited) — **Lang Qin, Zhuo Cheng, Mengqing Guo, Yan Liu, Dikai Xu, Jonathan A. Fan, Liang-Shih Fan**

4:00 Paper 75b: Porous Composites As Host Materials for Lithium-Sulfur-Batteries (Invited) — **Sabrina Zellmer, Paul Titscher, Christine Burmeister, Arno Kwade, Sandra Breitung-Faes, Georg Garnweitner**

4:30 Paper 75c: Supported Nickel and Iron Oxide Nanoparticles for Catalytic Asphaltene Decomposition Under an Air/Vapor Atmosphere for Enhanced Oil Recovery (Invited) — **Juan Perez, Camilo A. Franco, Farid B Cortés**

(76) Processing

Tuesday, Apr 24, 3:30 PM
Marriott, Crystal C
Doris Segets, Chair
Sponsored by: Particle Design

3:30 Paper 76a: Production of Functionalized Powders Using Effervescent Spray Drying — **Socrates Foschini, Erich Windhab**

3:48 Paper 54y: 3D CFD-DEM Simulation of Particle Separation By Porous Media — **Maximilian Kerner, Kilian Schmidt, Albert Hellmann, David Hund, Siegfried Ripperger, Sergiy Antonyuk**

4:06 Paper 76c: Particle Design of Spray Dried Fat Powder - Impact of Lipid Distribution within Particles on Oxidative Stability — **Annika Linke, Heike Teichmann, Jochen Weiss, Reinhard Kohlus**

4:24 Paper 76d: Alginate Encapsulation As Drug Targeting Depot System — **Jan Tomas, Ondřej Navrátil, Ales Zadrazil, Frantisek Stepanek**

4:42 Paper 76e: An Investigation into the Effect of Process and Operational Parameters on the Spray Coating of Detergent Powders through Contact Spreading in Tumbling Drums — **Joshua Green, Kate Pitt, Norzaida Yusof, Andrew Campbell, Hossein Ahmadian, Prashant Gupta, Simon Greener, Jinsheng Fu, Clare Martin, Rachel Smith**

(77) Recent Developments in the Characterization of Pharmaceutical Materials III

Tuesday, Apr 24, 3:30 PM
Marriott, Crystal L
Chi-Hwa Wang, Chair
Satoru Watano, Co-Chair
Mario Hubert, Co-Chair
Sponsored by: Applications of Particle Technology for Pharmaceuticals

3:30 Paper 77a: Morphological Stability of Microencapsulated Lipophilic Compounds By AFM Imaging — **Alexandra Teleki, Karine Mougin**

3:48 Paper 77b: Multi-Sensor Measurements of Quantitative Particle Size and Shape Information in Crystal Slurries — **Carla Ferreira, Bilal Ahmed, Javier Cardona, Okpeafoh Agimelen, Jan Sefcik, Yi-Chieh Chen**

4:06 Paper 77c: Monitoring API Crystal Breakage in Wet Milling Using Inline Imaging and Chord Length Distribution

Measurements — **Bilal Ahmed, Vaclav Svoboda, Okpeafoh Agimelen, Javier Cardona, Jerzy Dziejewicz, Cameron Brown, Thomas McGlone, Alison Cleary, Christos Tachtatzis, Craig Michie, Alastair J. Florence, Ivan Andonovic, Anthony Mulholland, Jan Sefcik**

4:24 Paper 77d: Investigating Surface Energy Heterogeneity of Processed Lactose Powders — **Vikram Karde, Andrew E. Jefferson, Jerry Y.Y. Heng, Gerald Hebbink**

4:42 Paper 77e: Nonlinear Radial Stress Response during Uniaxial Die Decompression — **Pingjun Tang, Joseph W. Bullard**

(78) Segregation and Mixing - Modeling, Simulations and Applications II

Tuesday, Apr 24, 3:30 PM
Marriott, Crystal B
Stefan Luding, Chair
Francisco J. Cabrejos, Co-Chair
Sponsored by: Handling & Processing of Granular Systems

3:30 Paper 78a: Numerical Study of Vibration Induced Segregation with Ellipsoids — **Dizhe Zhang, David Pinson, Zongyan Zhou**

3:50 Paper 78b: New Mass Flow Limiting Lines Based on Segregation Pattern and Magnitude — **Kerry Johanson**

4:10 Paper 78c: CFD Simulation of Binary Mixture: Particle Segregation — **Matthew A. Hamilton**

4:30 Paper 78d: Design of Powder Processing Equipment By DEM Simulation — **Junya Kano, Shingo Ishihara**

4:50 Discussion

(79) Spray Drying

Tuesday, Apr 24, 3:30 PM
Marriott, Crystal P
Madhusudhan Kodam, Chair
Bereket Yohannes, Co-Chair
Sponsored by: Applications of Solids Processing Unit Operations

3:30 Paper 79a: Experimental Investigation of Single Droplet Drying Above Boiling Point — **Wael Ebrahim, Andrew E. Bayly**

3:52 Paper 79b: On the Development of an Innovative and Sustainable Spray Drying Technology — **Loredana Malafronte, Lilia Ahmé, Erich Windhab**

4:14 Paper 79c: Energy Efficient Spray Drying By the Use of Superheated Steam with a Focus on Process Evaluation and Powder Properties of Food Products — **Tobias Balke, Reinhard Kohlus**

4:36 Paper 79d: Model Enhanced Prediction of Self-Heating in Detergent Spray Dryer Wall Build-up — **Lewis Maxfield, Andrew Bayly, Luis Martin De Juan**

(80) Carbon Capture, Utilization, and Storage and Low-Carbon Energy Conversion II

Tuesday, Apr 24, 4:00 PM

Marriott, Crystal K
Clay Sutton, Chair
Rustum Billimoria, Co-Chair
Benjamin Glasser, Co-Chair
Jennifer Wilcox, Co-Chair
Sponsored by: Applications for Sustainable Energy & Environment

4:00 Paper 80a: Carbon Capture, Utilization and Storage (CCUS) via Innovative Mineralization Pathways — **Guanhe Rim, Mark S Rayson, Geoffrey F Brent, Ah-Hyung Alissa Park**

4:30 Paper 80b: Particle Size Characterization in Mineral Carbonation for Understanding Reaction Fundamentals — **Rafael M. Santos**

5:00 Paper 80c: Viennagreen CO₂ Capture Pilot Plant Laboratory De-Risking, Design and Testing Objectives — **Melina Infantino, Gerhard Schoeny**

(81) Advances in Particle Engineering for Pharmaceutical Applications IV
Wednesday, Apr 25, 8:15 AM

Marriott, Crystal M
Chi-Hwa Wang, Chair
Ecevit Bilgili, Co-Chair
Sponsored by: Applications of Particle Technology for Pharmaceuticals

8:15 Paper 81a: Isolating Rate Processes in Spherical Agglomeration: An Investigation of the Breakage Mechanism Using a Contracting Nozzle — **Siti Norfarahin Mohd Yusoff, Kate Pitt, Omid Arjmandi-Tash, James D. Litster, Rachel Smith**

8:33 Paper 81b: Development Strategies of Advanced Bio-Prototype Based on Particle Design Technology — **Woo Sik Choi, Shigeki Toyama, Won Hoon Park**

8:51 Paper 81c: Healing Formulation of South Korean Loess Powder As Bio Material and Its Application to Environmental Friendly Bio Products — **Woo Sik Choi, Shigeki Toyama, Yeon Jin Choi**

9:09 Paper 81d: Mesoporous Silica Particles Used for Amorphous Pharmaceutical Formulations — **Marek Šoltys, Sarah Akhlová, Jakub Mužík, Martin Balouch, David Zúza, Aleš Zdražil, Ondřej Kašpar, Pavel Kovačik, Josef Beránek, František Štěpánek**

9:27 Paper 81e: Use of Supercritical-CO₂ Assisted Spray Drying Technology for the Production of Pharmaceutical Powders — **Cláudia Moura, Teresa Casimiro, Rui C. Silva, Eunice Costa, Ana Aguiar-Ricardo**

(82) Agglomeration
Wednesday, Apr 25, 8:15 AM
Marriott, Crystal D
Stefan Heinrich, Chair
James D. Litster, Co-Chair
Sponsored by: Particle Interactions

8:15 Paper 82a: Anti-Agglomeration Strategy Study of

High Sodium Coal Gasification in a Commercial Circulating Fluidized Bed Gasifier — **HaiXia Zhang, KuangShi Yu, ZhiPing Zhu, Weiwei Liu**

8:30 Paper 82b: Experimental Investigation and Force Balance Modeling of Wet Particle Collisions — **Britta Buck, Yali Tang, Niels G. Deen, Hans J.A.M. Kuipers, Stefan Heinrich**

8:45 Paper 82c: Interaction Forces in Relation to Agglomerate Size of Hydrophobic Particles — **Paul Knüpfer, Urs A. Peuker**

9:00 Paper 82d: Characterizing Nanoparticle Agglomerates in a Nanopowder Fluidized Bed — **J. Ruud van Ommen, Andrea Fabre, Samir Salameh, Michiel Kreutzer**

9:15 Paper 82e: Granule Structure and Formation Mechanisms of Single Drop Formed Granules from Binary Mixtures — **Tianxiang Gao, Arun Sundar S. Singaravelu, Nikhilesh Chawla, Heather N. Emady**

9:30 Paper 82f: Forming Lumps and Jets when Pouring Particles through a Liquid Interface — **Xin Yi Ong, Spencer E. Taylor, Marco Ramaioli**

(83) Computational Aspects of Fundamentals of Fluidization (Invited Talk)
Wednesday, Apr 25, 8:15 AM

Marriott, Crystal F
Madhusudhan Kodam, Chair
Sponsored by: Fluidization & Multiphase Flow

8:15 Paper 83a: Turbulent Closure Models for Multiphase Fluids — **Charles A. Petty, André Bénard**

8:37 Paper 83b: CFD-DEM Study of Bubble Properties in a Single Jet Fluidized Beds — **Zongyan Zhou, Siddhartha Shrestha**

8:54 Paper 83c: Statistical Analysis on Large-Scale Direct Numerical Simulation of Gas-Solid Flow — **Limin Wang, Wei Ge**

9:11 Paper 83d: CFD-DEM

Simulations of Bubbling Fluidization: Global Sensitivity Analysis for the Identification and Validation of Critical Model Parameters — **Akhilesh Bakshi, Mehrdad Shahnám, Tingwen Li, Christos Altantzis, Aytekin Gel, William A. Rogers, Ahmed F. Ghoniem**

9:28 Paper 83e: Capillary Interaction in DEM Simulations of Wet Particulate Materials — **Francesco P. Di Maio, Alberto Di Renzo**

(84) Innovations in Scale-Up/Scale-Down of Pharmaceutical Unit Operations

Wednesday, Apr 25, 8:15 AM

Marriott, Crystal L
John Gawel, Chair
Julianna Magnus, Co-Chair
Preetanshu Pandey, Co-Chair
Sponsored by: Applications of Particle Technology for Pharmaceuticals

8:15 Paper 84a: Spray Drying Scale-up Based on a Development By Design Approach — **Rui C. Silva, Cláudia Moura, João Vicente, Márcio Temtem**

8:37 Paper 84b: Large Scale Discrete Element Modeling (DEM) Using Rocky Multi-GPU Solver for Various Process Equipment — **Rahul Bharadwaj, Lucilla Almeida, Brenda Remy, Preetanshu Pandey**

8:59 Paper 84c: Scale up of Dry Granulation from Pilot Scale to Commercial Manufacturing — **John Gawel, Admassu Abebe, Preetanshu Pandey, Steve Pafiakis, Jing Tao**

9:21 Paper 84d: Role of the Ejection Process in the Capping of Pharmaceutical Biconvex Tablet after Compaction: A FEM Study — **Vincent Mazel, Harona Diarra, Virginie Busignies, Pierre Tchoreloff**

(85) Micro-Macro Characterization, Relationships Modelling and Engineering Applications
Wednesday, Apr 25, 8:15 AM

Marriott, Crystal A
Ugur Tuzun, Chair
Bernd Sachweh, Co-Chair
Sponsored by: Particle & Bulk Powder Characterization

8:15 Paper 85a: Elastic Waves in Particulate Stiff Granular Soft Material Mixtures: Experiments and Simulations — **Kianoosh Taghizadeh, Holger Steeb, Vanessa Magnanimo, Stefan Luding**

8:30 Paper 85b: Effect of Size and Mechanical Properties of Particles on the Microstructure and Tensile Strength of Compacted Powders — **Bereket Yohannes, Xue Liu, Alberto Cuitino**

8:45 Paper 85c: Random Packings of Polydisperse Adhesive Microspheres with Gaussian Size Distribution — **Wenwei Liu, Sheng Chen, Shuiqing Li**

9:00 Paper 85d: Comprehensive Characterization of Stressing in Mills By Particle Probes — **Stefan Romeis, Alexander Strobel, Patrick Herre, Jochen Schmidt, Wolfgang Peukert**

9:15 Paper 85e: Characterization and Optimisation of Autoclave Production Process Parameters of Particulate Reinforced Polymer Matrix Composites for Aerospace and Marine Applications — **Adefemi C. Adeodu, Christopher C. Anyaeche, Oluleke O. Oluwole**

9:30 Paper 85f: Breakage of Frac and Tailing Sands in Centrifugal Pumps — **Andrey V. Bekker, Judy McShane, Dianne Bedell, Iztok Livk**

(86) Mixing and Blending Wednesday, Apr 25, 8:15 AM

Marriott, Crystal P
Carl Wassgren, Chair
Joerg Theuerkauf, Co-Chair
Sponsored by: Applications of Solids Processing Unit Operations

8:15 Paper 86a: Use of Process Analytical Technology (PAT) for Monitoring and Optimizing Powder Mixing Processes — **Volker Kehlenbeck**

8:37 Paper 86b: Establishment of a General Correlation Accounting for Impeller-to-Wall Distance in a Bladed Powder Mixer Operating in the Cataracting Regime — **Bichun Huang, Kevin Phan, Cendrine Gatamel, Mathieu Milhé, Henri Berthiaux**

8:59 Paper 86c: X-Ray Particle Tracking in Vertical Bladed Mixers — **Humair Nadeem, Theodore J. Heindel**

9:21 Paper 86d: Modeling Granular Material Mixing and Segregation Using a Finite Element Method and Advection-Diffusion-Segregation Equation Multi-Scale Model — **Yu Liu, Marcial Gonzalez, Carl Wassgren**

(87) Modeling and Simulation of Bulk Solids and Granular Systems

Wednesday, Apr 25, 8:15 AM

Marriott, Crystal B
Subhash Thakur, Chair
Pablo Garcia Triñanes, Co-Chair
Sponsored by: Handling & Processing of Granular Systems

8:15 Paper 87a: Application of Metamodeling Techniques to Calibrate DEM Models: What about Efficiency? — **Michael Rackl, Johannes Fottner**

8:37 Paper 87b: DEM Simulation with Reduced Particle Stiffness — **Kimiaki Washino, E. L. Chan, Toshitsugu Tanaka**

8:59 Paper 87c: Simulation Analysis for Softening and Melting Behavior of Packed Bed Using Adem-SPH — **Shingo Ishihara, Junya Kano**

9:21 Paper 87d: Comparison of Kinetic Liquid Bridge Force Models in DEM — **Ei L. Chan, Kimiaki Washino**

(88) Novel and Non-Conventional Reactors and Multiphase Flow Systems I Wednesday, Apr 25, 8:15 AM

Marriott, Crystal E
L.S. Fan, Chair
Andrew Tong, Co-Chair
Sponsored by: Fluidization & Multiphase Flow

8:15 Paper 88a: Pressure Distribution in a Three Phase Moving Bed — **Yao Yang, Shaoshuo Li, Zhengliang Huang, Jingyuan Sun, Jingdai Wang, Yongrong Yang, Bing Du, Arsam Behkish, Bryan Patel, Xuejun Xiao**

8:45 Paper 88b: Numerical Study of Gas-Liquid Flow in Trickle Bed Using MPS Method — **Kei Sakakura, Ryou Tanabe, Yasunobu Kaneko**

9:05 Paper 88c: Theoretical and Experimental Study of Anaerobic Fluidized Bed Reactor: Case of Pharmaceutical Wastewater Treatment — **Brakchi Linda**

9:25 Paper 88d: Innovative Design for Improved Contact of Hydrocarbon Feedstock with Catalyst in a Downer Reactor — **Mukthiyar Sadhullah, Manoj Kumar Yadav, Hariprasad Gupta, Sathesh V, Debasis Bhattacharyya, SK Majumdar**

(89) Particle and Nanoparticle Functionalization for Environmental Applications I

Wednesday, Apr 25, 8:15 AM

Marriott, Crystal Q
Youngjune Park, Chair
Satish Nune, Co-Chair
Sponsored by: Particle & Nanoparticle Functionalization

8:15 Paper 89a: A Novel Thin Film Deposition Method of Doped TiO₂ Particles for Environmental Applications (Invited) — **Amjad Shaikh, Giacomo Benvenuti**

8:45 Paper 89b: Synthesis of Surface Functionalized Adsorbents for Adsorption of Metal Ions and Organic Pollutants By Atomic Layer Deposition (Invited) — **Xiaofeng Wang, Xinhua Liang**

9:15 Paper 89c: Effect of Surface Modification on Filtration Performance of Gas-Liquid Coalescing Filters (Invited) — **Feng Chen, Zhongli Ji, Qiangqiang Qi**

(90) Renewable Energy, Bioenergy and Energy Storage I Wednesday, Apr 25, 8:15 AM

Marriott, Crystal K
Zheng Chen, Chair
Sponsored by: Applications for Sustainable Energy & Environment

8:15 Paper 90a: Advances in Protic Ionic Liquids for Biomass Conversion into Biofuels and Bioproducts — **Blake A. Simmons**

8:45 Paper 90b: Dependence of Chemical Components in Woody Biomass Combustion Ash on the Particle Size and Its Utilization for the Fertilizer — **Kunihiro Fukui, Tomonori Fukasawa, Toru Ishigami, Norio Maeda**

9:15 Paper 90c: Synthesis and Design of Porous Nanospherical Particles for Vehicle Electrification — **Qiangfeng Xiao, Mei Cai**

(91) Simulation

Wednesday, Apr 25, 8:15 AM

Marriott, Crystal C
Avi Levy, Chair
Sponsored by: Particle Design

8:15 Paper 91a: Simulation and Experimental Studies on Hydrothermal Synthesis of Nanoparticles in a Batch Reactor — **Nagaravi Kumar Varma Nadimpalli, Rajdip Bandyopadhyaya, Venkataramana Runkana**

8:35 Paper 91b: DEM Simulation of the Spherulization Process with Pharmaceutical Pellets Using a Contact Model Developed Based on Experimental Results — **Dominik Weis, Maria Evers, Markus Thommes, Sergiy Antonyuk**

8:55 Paper 91c: Packing Structure Analysis of Flexible Rod Particles about Aspect Ratio, Bending Stiffness and Surface Energy — **Jinsu Nam, Dongjoo Kim, Junyoung Park**

9:15 Paper 91d: Rational Design of Crystalline Metal Oxide Nanoparticles through Synthesis Conditions: A Study Based on Experimental and Simulative Insights — **Pierre Stolzenburg, Georg Garnweitner**

TECHNICAL SESSIONS

(92) Solid Carriers for Separation and Reactive Separation

Wednesday, Apr 25, 8:15 AM

Marriott, Crystal N
Songgeng Li, Chair
Allan Issangya, Co-Chair
Sponsored by: Particle-Based Separations: Fundamentals & Applications

8:15 Introductory Remarks

8:20 **Paper 92a:** Mixed Oxide Particles As Oxygen Separation Agents for Methane Partial Oxidation and Water/Carbon Dioxide Splitting — **Fanxing Li**

8:45 Intermission

8:50 **Paper 92b:** Chemical Looping Combustion of Coal with Annular Carbon Stripper — **Mao Cheng**

9:15 **Paper 92c:** Greener Ethylene Production Via Chemical Looping Oxidative Dehydrogenation — **Vasudev Pralhad Haribal, Luke Neal, Seif Yusuf, Fanxing Li**

9:40 Concluding Remarks

(93) Workshop on Education in Particle Technology

Wednesday, Apr 25, 8:15 AM

Marriott, Crystal J2
George G. Chase, Chair
Karl Jacob, Co-Chair
Sponsored by: Education

8:15 **Paper 93a:** Enhancing Particle Technology Education through Art — **Brij M. Moudgil**

8:45 **Paper 93b:** Putting Particles First in Student Education- a Critical Review Why Particle Science Can't be Taught at "Traditional" Undergraduate and Graduate Chemical Engineering Programmes — **Pablo Garcia Triñanes, Stefan Zigan**

9:15 **Paper 93c:** Teaching Particle Technology to Engineering Students — **Marvin Meineche, Katharina Zilles, Marcus Petermann, Martin Rhodes, Raffaella Ocone**

(94) Plenary: Mesoscience - Opening a New Paradigm of Particle Technology (Invited Talk)

Monday, Apr 23, 11:00 AM

Marriott, Crystal G
Ray Cocco, Chair
Sponsored by: 8th World Congress on Particle Technology Plenaries

11:00 **Paper 94a:** Mesoscience: Opening a New Paradigm of Particle Technology — **Jinghai Li**

(95) World Congress on Particle Technology Student Poster Session

Wednesday, Apr 25, 11:45 AM

Marriott, Crystal H
Tim Bell, Chair
Sponsored by: Poster Sessions

Particle & Bulk Powder Characterization

Paper 95a: Particle Measurement in High Temperature Gas Based on Mie Scattering — **Lifeng LU Sr., Xiaolin Wu, Zhongli Ji, Mingxing WANG Sr.**

Paper 95b: An Experimental Investigation of Single Droplet Drying Above Boiling Point — **Wael Ebrahim, Andrew Bayly**

Paper 95c: Characterising Powder Flow in Dynamic Processes — **Marvellous J. Khala, Colin Hare, Chuan-Yu Wu, Martin Murtagh, Navin Venugopal, Tim Freeman**

Paper 95d: Testing the Flowability of Fibrous and Woody Biomass for Various Particle Size Distributions and Moisture Levels — **Spandana Vajjala, Heather N. Emady**

Paper 95e: Impact of Non-Spherical Projectiles on Granular Media — **Spandana Vajjala, Hosain Bagheri, Hamid Marvi, Heather N. Emady**

Paper 95f: Computational and Experimental Shear Cell Study with Rigid Cylindrical Particles — **Liliana Bello, Kevin E. Buettner, Yu Guo, Virginia Lane, Haim Kalman, Jennifer Sinclair Curtis**

Paper 95g: Influence of Alumina Support Crystallinity on ALD-Synthesized Cobalt Catalysts for Fischer-Tropsch Synthesis — **Jacob M. Clary, Staci A. Van Norman, Dong Su, Eric A. Stach, John L. Falconer, Charles B. Musgrave, Alan W. Weimer**

Paper 95h: Quartz Crystal Microbalance As a Technique to Probe the Rheological Properties of Particulate Suspensions — **Johannes Andries Botha, Timothy N. Hunter, Chris S. Hodges, Robin Cowley, Simon E. Woodbury, Graham A. Mackay, Simon Biggs, David Harbottle**

Paper 95i: Defluidization Behaviour of Industrial Reactive Powders at High Temperature — **Domenico Macri', Paola Lettieri**

Paper 95j: Manufacturing and Characterization of Spherical Blend PBT-PC Particles for Additive Manufacturing — **Maximilian A. Dechet, Juan S. Gómez Bonilla, Jochen Schmidt, Wolfgang Peukert**

Particle Interactions

Paper 95k: Investigation of Agglomerate Breakage Using 3D Printing and DEM Modelling Method — **Ruihuan Ge**

Paper 95l: Effect of Particle Size Distribution and Wettability on Penetration Behavior, Granule Formation and Granule Properties in Single Drop Granulation — **Tianxiang Gao, Arun Sundar S. Singaravelu, Nikhilesh Chawla, Heather N. Emady**

Particle Design

Paper 95m: Atomically Deposited Sintering Aids: Assessing the Effects of Alumina Particle ALD on the Sintering and Performance of SOFC Electrolytes and Dental Ceramics — **Rebecca O'Toole, Christopher J. Bartel, Maila Kodas, Alexa Horrell, Sandrine Ricote, Neal P. Sullivan, Austin Drake, Christopher Gump, Robert Hall, Charles B. Musgrave, Alan W. Weimer**

Handling & Processing of Granular Systems

Paper 95n: Effect of Particle Size Distribution and Operating Parameters on Conduction and Convection Heat Transfer Mechanisms in Rotary Drums — **Manogna Adepu, Shaohua Chen, Yang Jiao, Aytekin Gel, Heather N. Emady**

Particle & Nanoparticle Functionalization

Paper 95o: Selective Hydrogenation of Citral over Supported Pt Catalysts on Various Substrates — **Xiaofeng Wang, Xinhua Liang**

Particle Classification

Paper 95p: Numerical Simulation of Particle Classification in a Classifier Based on Coanda Effect — **Dongjoo Kim, Seok-Min Jeong, Junyoung Park, Youngjin Seo**

Fluidization & Multiphase Flow

Paper 95q: Numerical Simulation of the Secondary Air Distribution Layer in the Gas Solid Fluidized Bed Based on Fluent Software — **Bo Lv Sr., Zhenfu Luo**

Paper 95r: CFD-DEM Simulation of the Fluidization of Non-Spherical Particles in Fluidized Bed — **Huaqing Ma, Yongzhi Zhao**

Paper 95s: CFD and DEM Simulation of the Cold Spray Process for Surface Coating with Fine Particles — **Paul Breuninger, Fabian Krull, Sergiy Antonyuk**

Paper 95t: Two-Fluid Validation of Constitutive Models for the Simulation of Cylindrical Particles — **Kevin E. Buettner, Yu Guo, Sofiane Benyahia, Jennifer Sinclair Curtis**

Paper 95u: The Comparison of Coarse Grained CFD-DEM for Simulating the Dense Bubbling Fluidized Bed" Requires Immediate Action — **Yong Zhang, Junwu Wang, Ge Wei,**

ChenLong Duan, Yuemin Zhao

Paper 95v: Stability Analysis of Uniform Gas Solids Flow — **Chenxi Zhang, Weizhong Qian, Fei Wei**

Paper 95w: Numerical Simulation of Particle Sedimentation Related to Nuclear Safety By CFD-DEM Algorithm — **Byoungcheol Hwang, Kiyofumi Moriyama, Hyun Sun Park**

Paper 95x: Application of Extended Discrete Element Method to the Melting Process of a Packed of Particles — **Mehdi Bniasadi, Maryam Baniyasi, Bernhard Peters, Xavier Besseron**

Paper 95y: Real-Time Interpretation of Chaotic Characteristics and Instability of Dense Gas Solid Fluidization — **Cheng Sheng, Chenlong Duan, Liang Dong, Tao Liu, Chenyang Zhou, Jinpeng Qiao, Yuemin Zhao**

Applications for Sustainable Energy & Environment

Paper 95z: Stable Cyclic Performance of Li_{1.2}Mn_{0.54}Ni_{0.13}Co_{0.13}O₂ Modified By Conductive CeO₂ Film — **Yan Gao, Xinhua Liang**

Particle-Based Separations: Fundamentals & Applications

Paper 95aa: Numerical Simulation of a Counter-Current Moving-Bed Reducer Reactor for Gaseous Chemical-Looping Combustion Using Methane As Feedstock — **Yu-Yen Chen, Andrew Tong, Liang-Shih Fan**

Applications of Particle Technology for Pharmaceuticals

Paper 95ab: Glucan Particles As Potential Carriers of Natural Flavonoids for Treatment of Idiopathic Inflammation Diseases — **Petra Šalamúnová, Jaroslav Hanuš, Jan Hošek, Domink Rotrekl, Ivan Saloň, Zuzana Plavcová, František Štěpánek, Gabriela Ruphuy Chan**

Paper 95ac: Use of Advanced Imaging Techniques in Tablet Disintegration Study — **Jakub Dvorak, Denisa Lizonova, Marek Schongut, Frantisek Stepanek, Josef Beranek**

Paper 95ad: Correlation Study between Liquid Penetration and Mechanical Properties of Pharmaceutical Tablets — **Jan Tomas, Jakub Dvorak, Marek Schongut, Frantisek Stepanek, Josef Beranek, Ondrej Dammer**

Paper 95ae: In Situ Drug Amorphisation By Microwave Irradiation Stabilized By Mesoporous Silica — **Jakub Mužík, David Zůza, Marek Šoltys, Denisa Lizoňová, Aleš Zadražil, Pavel Kovačik, František Štěpánek**

Paper 95af: Manufacture of Personalised Medicines By API Printing on Porous Tablets — **Sarah Akhlasová, Marek Šoltys, Pavel Kovačik, Aleš Zadražil, František Štěpánek**

Paper 95ag: Understanding Phase Transition of Acetaminophen in the Bulk and Surface of Acetaminophen — **Hanane Abouhakim**

Paper 95ah: Treatment of Cystinosis through Vitamin E Modified Silicone Hydrogel — **Phillip Dixon**

Paper 95am: Systems Integration for Dry Granulation Based Continuous Pharmaceutical Tableting — **Sudarshan Ganesh, idiyastuti Mariana Moreno, Yasasvi Bommireddy, Qinglin Su, Marcial Gonzalez, Zoltan Nagy, Gintaras Reklaitis**

Applications of Solids Processing Unit Operations

Paper 95ai: Modeling Granular Material Mixing and Segregation Using a Multi-Scale Model — **Yu Liu, Marcial Gonzalez, Carl Wassgren**

Special Topics in Particle Technology

Paper 95ak: Modelling Granular Media with Dynamical Density Functional Theory — **Timothy D. Hurst**

Paper 95al: A Study on Partially Wetted Particle Collisions with a Wet Wall — **Evan Milacic**

(96) Advances in Particle Engineering for Pharmaceutical Applications V

Wednesday, Apr 25, 1:30 PM

Marriott, Crystal M
Chi-Hwa Wang, Chair Ecevit Bilgili, Co-Chair
Sponsored by: Applications of Particle Technology for Pharmaceuticals

1:30 Paper 96a: Understanding the Role of Drying History on the Crystallisation of Dehydrating Lactose Particles — **May Ginn (Jaclyn) Lee, Shahnaz Mansouri, Karen P. Hapgood, Meng Wai Woo**

1:48 Paper 96b: Scale up Methodology and Practical Application of Wet Bead Milling for the Production of Submicron Particles — **Christopher J. Morrison, Deepak Mundhra, Wendy Knight**

2:06 Paper 96c: Design and Optimization of an Equipment for Active Pharmaceutical Ingredients — **Elena-Lavinia Niederhäuser, Richard Wegmueller**

2:24 Paper 96d: Designing and Characterizing Chitosan Particles for Drug and Vaccine Delivery Applications — **Tara Seigle, Allison Purdy, James M. Myrick, Sitaraman Krishnan**

2:42 Paper 96e: Manufacturing Method of Black Ginseng Prepared By Repeated Heating, Steaming and Drying Processes Using Loess Mortar Balls and Its Biological Characteristics As a Health Functional Food — **Woo Sik Choi**

(97) Application of Particle Technology in Drug Design for Improving Patient Compliance I

Wednesday, Apr 25, 1:30 PM

Marriott, Crystal L
Brenda Remy, Chair Weixian Shi, Co-Chair
Sponsored by: Applications of Particle Technology for Pharmaceuticals

1:30 Paper 97a: Preparation of Glucan Microparticles with Curcumin for Treatment of Idiopathic Inflammation Diseases — **Petra Šalamúnová, Jaroslav Hanuš, František Štěpánek, Gabriela Ruphuy Chan, Ivan Saloň, Zuzana Plavcová, Domink Rotrekl, Jan Hošek**

1:53 Paper 97b: Long-Term Dissolution Method for Intramuscular Suspension — **Róbert Lehocký, Erik Sonntag, Suada Djukaj, Daniel Pěček, František Štěpánek**

2:15 Paper 97c: High Drug-Loaded Surfactant-Free Nanocomposite Microparticles for Enhanced Dissolution of Poorly Soluble Drugs — **Meng Li, Rajesh Davé, Ecevit Bilgili**

2:38 Paper 97d: Convective Drying Kinetics of Polymer Strip Films — **Alireza Naseri, Eylül Cetindag, Joseph Forte, Rajesh Davé, Ecevit Bilgili**

(98) Computational Approaches in Fluidization Fundamentals I (Invited Talk)

Wednesday, Apr 25, 1:30 PM

Marriott, Crystal F
Clay Sutton, Chair
Sponsored by: Fluidization & Multiphase Flow

1:30 Paper 98a: An Idea of DEM-CFD Coupling Model Decoupling Spatial Averaging Scale from Computational Cell Size — **Takuya Tsuji, Yusuke Goto, Kimiaki Washino, Toshitsugu Tanaka**

2:00 Paper 98b: Comparison of CFD Models in Predicting the Fluidization Behavior of Geldart B Particles — **Benjamin Amblard, Stephane Bertholin, Ann Forret, Thierry Gauthier, Sina Tebianian**

TECHNICAL SESSIONS

2:40 Paper 98c: Evaluation of Drag Models for Gas-Solid Fluidization of Geldart a Particles in All Flow Regimes — **Xi Gao, Tingwen Li, Liqiang Lu, William A. Rogers**

(99) Discrete Element Modeling of Cohesive Materials

Wednesday, Apr 25, 1:30 PM

Marriott, Crystal B
Subhash Thakur, Chair
Pablo Garcia Triñanes, Co-Chair
Sponsored by: Handling & Processing of Granular Systems

1:30 Paper 99a: Discrete Element Modeling to Predict Triboelectrification in Pharmaceutical Powders — **Raj Mukherjee, Bodhisattwa Chaudhuri**

1:52 Paper 99b: DEM Simulation of Aggregates Formation in Granular Shear Flow — **Toshitsugu Tanaka, Yuichi Akiyama, Ryosuke Hama, Kimiaki Washino, Takuya Tsuji**

2:14 Paper 99c: Rheology of Homogeneous and Inhomogeneous Granular Materials — **Hao Shi, Sudeshna Roy, Thomas Weinhart, Vanessa Magnanimo, Stefan Luding**

2:36 Paper 99d: Simulations of Impact Breakage of Cuboidal and Spherical Wet Agglomerates of Fine Particles — **David L. Liu, Wenting Shu**

(100) Education and New Tools in Instruction for Particle Science and Technology

Wednesday, Apr 25, 1:30 PM

Marriott, Crystal J2
Ryan C. Snyder, Co-Chair
Timothy Raymond, Co-Chair
Sponsored by: Education

1:30 Paper 100a: The Hypersonic Tomato and Other Adventures of a Solids Processing Class at the University of Michigan — **Karl Jacob**

1:52 Paper 100b: from the Overhead Projector to e-Learning

Strategies and Tools: A Personal Journey to Teaching Powder's Unit Operations over 20 Years — **Henri Berthiaux**

2:14 Paper 100c: Simplifying Population Balance Models to Promote More Widespread Use — **R. Bertrum Diemer Jr.**

2:36 Paper 100d: Case Study Modules in Particle Technology — **Timothy M. Raymond**

(101) Industrial Applications of Solids Processing

Wednesday, Apr 25, 1:30 PM

Marriott, Crystal C
Kerry Johanson, Chair
Hans Schneider, Co-Chair
Sponsored by: Handling & Processing of Granular Systems

1:30 Paper 101a: Experimental and Simulation Investigation on Arching Behaviour of Two Biomass Materials from a Wedge Shape Hopper — **Hamid Salehi Kahrizsangi, Daniele Sofia, Diego Barletta, Massimo Poletto, Sylvia Larsson**

1:52 Paper 101b: Experimental and Numerical Study of Discharge Rates for Cohesive Particles in Hopper Geometries — **Robert Hesse, Sergiy Antonyuk**

2:14 Paper 101c: Validating the Conductive Heating Time Scales of Particles in a Rotary Drum — **Manogna Adepu, Shaohua Chen, Yang Jiao, Aytekin Gel, Heather N. Emady**

2:36 Paper 101d: DEM Simulation and Analysis of the Effects of Compression Pressure on Appropriate Adhesive Force of Admixed Particle for Improving Packing Fraction — **Mikio Yoshida, Ryota Takatsuki, Genta Sakamoto, Jun Oshitani, Kuniaki Gotoh, Atsuko Shimosaka, Yoshiyuki Shirakawa**

(102) Interparticle Forces I

Wednesday, Apr 25, 1:30 PM

Marriott, Crystal D
Colin Hare, Chair
Naoyuki Ishida, Co-Chair

Sponsored by: Particle Interactions

1:30 Paper 102a: Influence of Interparticle Forces and Particle Collision Properties on the Fluidization Behavior at Elevated Temperatures — **Milan Mihajlovic, Ivo Roghair, M. van Sint Annaland**

1:52 Paper 102b: Wet Stirred Media Milling of Organic Crystals: Interactions between Product Formulation, Grinding Media Wear and Colloidal Stability — **Frederik Flach, Sandra Breitung-Faes, Arno Kwade**

2:14 Paper 102c: Hydrophobic Attraction between Silanated Silica Surfaces of Different Hydrophobicity — **Naoyuki Ishida, Kohei Matsuo, Hiroyuki Imanaka, Koreyoshi Imamura**

2:36 Paper 102d: Determination of Particle Surface Properties Using Hansen Dispersibility Parameters Demonstrated By Means of Carbon Black and Functionalized ZnO Nanoparticles — **Doris Segets, Sebastian Süß, Titus Sobisch, Wei Lin, Wolfgang Peukert, Dietmar Lerche**

(103) Mixing Segregation Principles

Wednesday, Apr 25, 1:30 PM

Marriott, Crystal P
Richard M. Lueptow, Chair
Yi Fan, Co-Chair
Sponsored by: Applications of Solids Processing Unit Operations

1:30 Paper 103a: Elutriation, Particle Separation, Fines, Cold Flow, Energy, Fluidized Bed, Bubbling — **Nicholas Hillen, Steven Rowan, Ronald W. Breault, Justin Weber**

1:52 Paper 54i: Segregation during Die Filling with Air-Sensitive Powders — **Joesry El Hebieshy, Qiong Cai, Charley Wu**

2:14 Paper 103c: Reducing Segregation By Wet Granulation — **Yi Fan, Bruce D. Hook, Karl Jacob**

(104) Multi-Scale Particulate Process Modelling and Design: Industry-Led Applications

Wednesday, Apr 25, 1:30 PM

Marriott, Crystal A
Ugur Tuzun, Chair
Alvaro Ramirez Gomez, Co-Chair
Sponsored by: Particle & Bulk Powder Characterization

1:30 Paper 104a: Strategies to Establish Mechanistic Liquid Transport Models for Wet Granular Matter — **Johannes G. Khinast, Stefan Radl**

1:50 Paper 104b: Multi-Scale Characterization of Powder Compaction Spanning Single Particle, Single Tablet Fabrication, and Industrial Rotary Tablet Press — **Yasasvi Bommireddy, Marcial Gonzalez**

2:05 Paper 104c: Experiments and Simulations on Particle Impregnation By Metal Solutions for Industrial Catalysts: From Fundamentals to Scale up — **M. Silvana Tomassone, Yangyang Shen, William G. Borghard**

2:20 Paper 104d: Multi-Scale Computational Modeling of Selective Laser Melting — **Daniel Moser, Jayanthi Murthy**

2:35 Paper 104e: Accelerated Heat Transfer Simulations Using Coupled CFD and DEM — **Marina Sousani Dr, Andrew M. Hobbs, Adam Anderson Dr, Richard Wood Dr**

2:50 Paper 104f: Multi-Scale Particulate Process Modelling and Design: Industry-Led Applications (Round-table discussion) — **Ugur Tuzun**

(105) Novel and Non-Conventional Reactors and Multiphase Flow Systems II

Wednesday, Apr 25, 1:30 PM

Marriott, Crystal E
L.S. Fan, Chair
Andrew Tong, Co-Chair
Sponsored by: Fluidization & Multiphase Flow

1:30 Paper 105a: Two Sphere Aggregation in a Shear Thinning

Fluid — **Katherine Bailes**, Rodrigo Guadarrama-Lara, Xiaodong Jia, Mike Fairweather, David Harbottle

2:00 Paper 105b: Binary Solid Mixture Separation in a Cold Flow Spouted Bed for Chemical Looping Applications — **Michael Bobek**, Justin Weber, Steven Rowan, Jingsi Yang, Nicholas Hillen, Ronald W. Breault

2:20 Paper 105c: Gravity-Based Percolation of Small Particles through an Assembly of Large Particles — **Arthur N'dri Konan**, David E. Huckaby, Justin Weber

2:40 Paper 105d: Partition Effect of Coal and Quartz Particles in a Gas-Solids Fluidization Bed with Applied Electric Field — **Haifeng Wang**, Zhen Peng, Guangwen Zhang, Xiaolu Zhao, Jinshan Yang, Yaqun He, Yuemin Zhao

(106) Particle and Nanoparticle Functionalization for Environmental Applications II

Wednesday, Apr 25, 1:30 PM

Marriott, Crystal Q
Youngjune Park, Chair
Satish Nune, Co-Chair
Sponsored by: Particle & Nanoparticle Functionalization

1:30 Paper 106a: Water Expulsion from Carbon Rods at High Humidity (Invited) — **Satish Nune**, David J. Heldebrant, David Lao, Matthew Olszta, Yongsoon Shin, Xiao-Ying Yu, Juan Yao

2:00 Paper 106b: Carbon Nanotubes to Immobilize Heavy Metals in Contaminated Soils (Invited) — **Antonio Alberto Correia**, Martim Matos, **María G. Rasteiro**

2:30 Paper 106c: Study of ZnO Particles Preparation in Supercritical Water System: Experiments, Molecular Dynamics Simulations, and Photocatalytic Activity Evaluation (Invited) — **Xiaojuan Wang**, Zhijun Liu, Zhiyi Li, Alei Zhu

(107) Particle and Nanoparticle Functionalization for Reaction and Separation Processing I

Wednesday, Apr 25, 1:30 PM

Marriott, Crystal N
Satish Nune, Chair
Karsten Wegner, Co-Chair
Sponsored by: Particle & Nanoparticle Functionalization

1:30 Paper 107a: Structuring and Functionalization of Iron Oxide Nanoparticles for Continuous Automated in Situ Protein Purification (Invited) — **Lennart Kleinfeldt**, Johannes Gädke, Rebekka Biedendieck, Rainer Krull, Georg Garnweitner

2:00 Paper 107b: Functionalization of Aerogel Particles By Coating in a Spouted Bed (Invited) — **Monika Goslinska**, Ilka Selmer, Irina Smirnova, Stefan Heinrich

2:30 Paper 107c: Investigating the Removal of Staphylococcus Aureus from Substrates By Modulating of Protein-Substrate Interactions (Invited) — **Vasanthakumar Balasubramanian**, Vignesh Nandakumar, Brij M. Moudgil

(108) Renewable Energy, Bioenergy and Energy Storage II

Wednesday, Apr 25, 1:30 PM

Marriott, Crystal K
Zheng Chen, Chair
Sponsored by: Applications for Sustainable Energy & Environment

1:30 Paper 108a: Computational Fluid Dynamic Study of Biomass Vapor-Phase Upgrading Process — **Tingwen Li**, Xi Gao, William A. Rogers, Rupen Panday, Jonathan Higham, Balaji Gopalan, Gregory Breault, Jonathan Tucker

2:00 Paper 108b: Renewable Solvents to Replace Water in the Synthesis of Battery Materials — **Yangchuan Xing**

2:30 Paper 108c: Conversion of Landfill Gas to Liquid Fuels through Tri-FTS Process

— **Xianhui Zhao**, Devin M. Walker, Tim Roberge, Matthew Kastelic, Paul Stachurski, Shrinand Shah, Babu Joseph, John Kuhn

(109) Special Topics in Particle Technology Keynote (Invited Talks)

Wednesday, Apr 25, 1:30 PM

Marriott, Crystal J1
Madhusudhan Kodam, Chair
Paola Lettieri, Co-Chair
Sponsored by: Special Topics in Particle Technology

1:30 Paper 109a: The Vagaries of Granular and Particle Laden Flow — **Raffaella Ocone**

2:00 Question & Answer

2:15 Paper 109b: Scaling Up Particulate Process - Lessons from Industry — **Timothy Bell**

2:45 Question & Answer

(110) Advanced Experimental Techniques in All Aspects of Particle Systems

Wednesday, Apr 25, 3:30 PM

Marriott, Crystal J1
Paola Lettieri, Co-Chair
Massimo Poletto, Co-Chair
Sponsored by: Special Topics in Particle Technology

3:30 Paper 110a: Experimental and Numerical Study of Structure and Hydrodynamics in Packed Beds of Spherical Particles — **Paolo Lovreglio**, Kay A. Buist, E.a.J.F. Peters, L. Pel, Hans J.A.M. Kuipers

3:48 Paper 110b: Analyzing Mechanical Labile Protein Crystals with a Special Filtration Cuvette — **Benjamin Radel**, Hermann Nirschl

4:06 Paper 110c: Up Scaling the Isamill with the Enhanced Stress Model — **Sandra Breitung-Faes**, Didier Schons, Arno Kwade

4:24 Paper 110d: Single Particle Behavior in Flowing Fine Powders: Augmenting Experiments with Simulations — **Laurent Gilson**, Stefan Luding, Günter K. Auernhammer

4:42 Paper 110e: Measurement of Rotational Motion in Granular Couette Flow Using Magnetic Resonance Imaging — **Daniel A. Clarke**, Hilary T. Fabich, Timothy I. Brox, Petrik Galvosas, Daniel J. Holland

(111) Application of Particle Technology in Drug Design for Improving Patient Compliance II

Wednesday, Apr 25, 3:30 PM

Marriott, Crystal L
Brenda Remy, Chair
Weixian Shi, Co-Chair
Sponsored by: Applications of Particle Technology for Pharmaceuticals

3:30 Paper 111a: The Effects of Mixing Processes on Critical Quality Attributes of Strip Films — **Jeremiah Castro**, Guluzar Buyukgoz, **Rajesh Davé**

3:53 Paper 111b: Comprehensive Study of Usage of Oil Liquid Marbles in Pharma Industry — **Ondrej Rychecky**, Petra Janska, Pavel Zvatora, Jitka Cejkova, Frantisek Stepanek

4:16 Paper 111c: Analysis of Nano Particles in Circulating Tumor Cells — **Suresh Ahuja**

4:38 Paper 111d: Impermeable Metal Nano-Capsules for Drug Delivery without Side Effects — **James Hitchcock**

(112) Computational Approaches in Fluidization Fundamentals II

Wednesday, Apr 25, 3:30 PM

Marriott, Crystal F
Kuo-chen Tsai, Chair
Kevin E. Buettner, Co-Chair
Sponsored by: Fluidization & Multiphase Flow

3:30 Paper 112a: On the Effect of Frictional Stress Modeling in Dense Fluidized Beds for Minimum Fluidization Conditions and in Bubbling Regime — **Renaud Ansart**, Olivier Simonin

3:48 Paper 112b: CFD-DEM Simulation of Fluidization in a 3D Spouted Bed and Flow Regime

Prediction Using MFX-DEM
— **Subhdeep Banerjee**, *Chris Guenther*, *William A. Rogers*

4:06 Break

4:24 Paper 112d: Uncertainty Quantification and Industrial Applications of Coarse Grained Particle Method — **Liqiang Lu**, *Sofiane Benyahia*

4:42 Paper 112e: EMMS Application in 3D Full Loop Circulating Fluidized Bed Simulation — **Qiuya Tu**, *Haigang Wang*

(113) Finite Element Modeling of Granular Materials

Wednesday, Apr 25, 3:30 PM

Marriott, Crystal B
Subhash Thakur, Chair
Pablo Garcia Triñanes, Co-Chair

Sponsored by: Handling & Processing of Granular Systems

3:30 Paper 113a: 2D Multi-Particle Finite Element Modelling on the Cold Isostatic Pressing of Al Powder — **Xizhong An**

3:52 Paper 113b: A Comparison of Finite Element Constitutive Models for Particulate Flow — **Kunal S. Pardikar**, *Carl R. Wassgren*, *Tyler L. Westover*

4:14 Paper 113c: Simulating Bilayer Tablet Compaction: Effect of Compaction Parameters and Material Properties on Tablet Attributes — **Shrikant Swaminathan**, *Hector Guzman*

4:36 Paper 113d: Sensitivity of Plastic and Elastic Parameters during the Numerical Simulation of Pharmaceutical Die Compaction Process with Drucker-Prager/Cap Model — **Harona Diarra**, *Vincent Mazel*, *Virginie Busignies*, *Pierre Tchoreloff*

(114) Industrial and Engineering Applications in Granular Systems

Wednesday, Apr 25, 3:30 PM

Marriott, Crystal C
Lyn Bates, Chair
Jin Ooi, Co-Chair

Sponsored by: Handling & Processing of Granular Systems

3:30 Paper 114a: The Importance of the Residence Time Distribution for Designing Solids Handling Process Plants — **Hans Schneider**

3:52 Paper 114b: Engineering of Assemblies of Inorganic Particles — **Yefeng Li**, *Andrew E. Bayly*, *David Harbottle*, *Stephen Sutcliffe*, *John Edwards*

4:14 Paper 114c: A Study of Effect of Horizontal Vibrations on Granular Flow in Conical Hopper Using Discrete Element Method (DEM) Approach — **Chetan Patel**, *Raj Kumar*, *Arun Kumar Jana*, *Srikanth R. Gopireddy*

4:36 Paper 114d: Granulation of Soft Porous Crystal Particles — **Shuji Ohsaki**, *Yuka Nakahara*, *Hideya Nakamura*, *Satoru Watano*

(115) Interparticle Forces II

Wednesday, Apr 25, 3:30 PM

Marriott, Crystal D
Colin Hare, Chair
Naoyuki Ishida, Co-Chair
Sponsored by: Particle Interactions

3:30 Paper 115a: Modeling and Simulation on Nylon Powder Paving Process in Selective Laser Sintering — **Yuanqiang Tan**, *Xiangwu Xiao*, *Shengqiang Jiang*

3:52 Paper 115b: Two Particle Type Blending for the Rheological Modification of Yield Stress Sediments — **Shafeeq Ahmed**, *Juliette Behra*, *Nicole Hondow*, *Timothy N. Hunter*, *David Harbottle*

4:14 Paper 115c: Collisional Dissipation Rate of Flexible Rods Measured Using Driven and Non-Driven DEM Simulations — **Kevin E. Buettner**, *Yu Guo*, *Liliana Bello*, *Jennifer Sinclair Curtis*

4:36 Paper 115d: Pickering foam Formulation By Wet Nano-Milling — **Róbert Lehocký**, *Ivan Salon*, *Milos Svoboda*, *Daniel Pěček*, *František Štěpánek*

(116) Mixing Segregation Simulations: Industrial Application

Wednesday, Apr 25, 3:30 PM

Marriott, Crystal P
Yi Fan, Chair
Richard M. Lueptow, Co-Chair
Sponsored by: Applications of Solids Processing Unit Operations

3:30 Paper 116a: Continuum Modeling of Granular Segregation in Hopper Discharge Flows — **Hongyi Xiao**, *Yi Fan*, *Karl Jacob*

3:52 Paper 116b: Head Formation in Bidisperse Shallow Granular Flows — **Irana Denissen**, **Thomas Weinhart**, *Stefan Luding*, *Anthony R. Thornton*

4:14 Paper 116c: Local Segregation Forces and Velocities in Granular Flows — **Richard M. Lueptow**, *Adithya Shankar*, *Paul B. Umbanhowar*, *Julio M. Ottino*

4:36 Paper 116d: Spatiotemporal Distribution of Granular Kinetic Energy in Rotating Tumblers with Axial Segregation — **Yongzhi Zhao**

(117) Novel and Non-Conventional Reactors and Multiphase Flow Systems III

Wednesday, Apr 25, 3:30 PM

Marriott, Crystal E
L.S. Fan, Chair
Andrew Tong, Co-Chair
Sponsored by: Fluidization & Multiphase Flow

3:30 Paper 117a: Hydrogen Transport through Consolidated Particulate Suspensions of Nuclear Corrosion Products; Insights from X-Ray Tomography — **Michael Johnson**, *Simon Biggs*, *Mike Fairweather*, *Jeffrey Peakall*, *Xiaodong Jia*, *David Harbottle*, *Timothy N. Hunter*

3:50 Paper 117b: Investigation of the Complex Gas-Solids Flow Characteristics in a Fluidized Bed with Multi-Cyclone Separators System By Process Tomography and CPFD Simulation — **Haigang Wang**, *Hanqiao Che*, *Qiuya Tu*, *Jiamin Ye*, *Wuqiang Yang*

4:20 Paper 117c: Experimental Study on Flow Characterization in a Rectangular Spouted Bed By Image Processing — **Jingsi Yang**, *Ronald W. Breault*, *Steven Rowan*, *Justin Weber*

4:40 Paper 117d: Atomic Layer Deposition and Other Applications of the Littleford Flow Mixer As a Mechanically Fluidized Bed — **Michael A. Smith**

(118) Particle and Nanoparticle Functionalization for Reaction and Separation Processing II

Wednesday, Apr 25, 3:30 PM

Marriott, Crystal N
Satish Nune, Chair
Karsten Wegner, Co-Chair
Sponsored by: Particle & Nanoparticle Functionalization

3:30 Paper 118a: Fabrication of Highly-Filled Composites By Spouted Bed Coating and Study of the Influence of Particle Shape on Mechanical Properties of the Materials (Invited) — **Eduard Eichner**, *Maksym Dosta*, *Stefan Heinrich*, *Gerald A. Schneider*

4:00 Paper 118b: Sedimentation and Magnetophoretic Velocity of Plain and Functionalized Magnetic Nanoparticles By in Situ Visualization of Separation Behavior in Superposed Gravity and Magnetic Fields (Invited) — **Dietmar Lerche**, *Markus Wolff*, *Torsten Detloff*, *Olga Mykhaylyk*

4:30 Paper 118c: Synthesis of Cerium Oxide Nanoparticles Under Reservoir-like Conditions (Invited) — **Shahid Pervaiz**, *Ghulam Raza*, *Muhammad Amjad*, *Dongsheng Wen*, *XiaoJun Lai*, *XiaoJun Lai*

(119) Renewable Energy, Bioenergy and Energy Storage III

Wednesday, Apr 25, 3:30 PM

Marriott, Crystal K
Zheng Chen, Chair
Sponsored by: Applications for Sustainable Energy & Environment

3:30 Paper 119a: Design of Particles and Electrodes for Electrochemical Energy Storage — **Gary M. Koenig Jr., Zhaoxiang Qi, J. Pierce Robinson, Hongxu Dong**

4:00 Paper 119b: Synchrotron x-Ray Tomography of Suspension Electrodes for Energy Storage and Water Desalination Applications — **Kelsey Hatzell, Marm Dixit, Daniel Moreno, Marta Hatzell**

4:30 Paper 119c: Enhanced Performance of Li-Rich Layered Cathode By CeO₂ Atomic Layer Deposition — **Yan Gao, Xinhua Liang**

(120) Sorbents and Sorbent-Based Separation Processes

Wednesday, Apr 25, 3:30 PM

Marriott, Crystal M
Christoph R. Müller, Chair
Andrew Tong, Co-Chair
Sponsored by: Particle-Based Separations: Fundamentals & Applications

3:30 Introductory Remarks

3:35 Paper 120a: Scaling Down a Purge Bin: a Multiscale Model-Centric Focus on Process Fundamentals — **Justin Federici, Bing Du, Sarah Feicht, Steven Haynie, Dave Sandell**

3:56 Paper 120b: Structural Characterisation, Growth Kinetics and Sedimentation Dynamics of Polymer-Mg/Al Hydroxide Flocculant Systems in the Nuclear Industry — **Alexander P. G. Lockwood, Timothy N. Hunter, David Harbottle, Jeffrey Peakall, Nicholas J. Warren, Geoff Randall**

4:17 Paper 120c: CO₂ Separation from Combustion Flue Gas Using Carbide Slag As CO₂ Carrier — **Songgeng Li, Wenli Song**

4:38 Paper 120d: Selective Separation of Cesium Contaminated Clays from Pristine Clays By Froth Flotation — **Huagui Zhang, Suparit Tangparitkul, Brogan Hendry, Joseph Harper, Timothy N. Hunter, Jae W. Lee, David Harbottle**

(121) Troubleshooting in Particle Technology

Wednesday, Apr 25, 3:30 PM

Marriott, Crystal J2
Shrikant Dhodapkar, Chair
Francisco J. Cabrejos, Co-Chair
Sponsored by: Education

3:30 Paper 121a: Using Computational Tools to Solve Industrial Problems — **Rahul Bharadwaj**

3:48 Paper 121b: Troubleshooting in Fluidized Bed Processes — **Ted Knowlton**

4:06 Paper 121c: Troubleshooting in the Pharmaceutical Industry — **James Michaels**

4:24 Paper 121d: Troubleshooting in Silos, Bins and Hoppers — **David A. Craig**

(122) Characterization of Nanoparticles I

Thursday, Apr 26, 8:15 AM

Marriott, Crystal A
Martin Morgeneyer, Co-Chair
Sponsored by: Particle & Bulk Powder Characterization

8:15 Paper 122a: Optical Single Particle Detection with Wide Dynamic Range for Nano- and Microparticle Sizing and Counting — **Martin Hussels, Heinz Lichtenfeld, H. Woehlecke, Elia Wollik, Dietmar Lerche**

8:30 Paper 122b: Continuous Synthesis and in Situ SAXS Analysis of Silica Nanoparticles in Liquid Phase — **Manuel Meier, Julian Ungerer, Hermann Nirschl**

8:45 Paper 122c: Advanced Characterization of Non-Spherical Nanoparticles — **Thaseem Thajudeen, Johannes Walter, Simon E. Wawra, Christian Luebbert, Rubitha Srikantharajah, Wolfgang Peukert**

9:00 Paper 122d: Time-Resolved Characterization of Customized Aluminum-Doped Zinc Oxide Nanocrystals By Means of Small-Angle X-Ray Scattering — **Julian Ungerer, Manuel Meier, Hermann Nirschl**

9:15 Paper 122e: Multiple Particle Size Distribution Characterization Techniques Applied to Certified Standards in the Nanoparticle Size Region — **Alan Rawle, Joerg Bolze**

9:30 Paper 122f: Analytical Ultracentrifugation As a Tool for Multidimensional Characterization of Nanoparticles — **Simon E. Wawra, Johannes Walter, Thomas J. Nacken, Christian E. Halbig, Thaseem Thajudeen, Siegfried Eigler, Gary Gorbet, Doris Segets, Borries Demeler, Wolfgang Peukert**

(123) Computational Methods for Industrial Fluidization Applications & Process Scale-Up I (Invited Talk)

Thursday, Apr 26, 8:15 AM

Marriott, Crystal F
Ronald W. Breault, Chair
Azita Ahmadzadeh, Co-Chair
Sponsored by: Fluidization & Multiphase Flow

8:15 Paper 123a: The Divide between Academia and Industry in Modeling Gas-Solids Reacting Flows — **Sreekanth Pannala**

8:45 Paper 123b: A CFD-DEM Analysis of Particle Attrition in a Cyclone — **Fabio Fulchini, Mojtaba Ghadiri, Mohammad Mahdi Yazdanpanah, Benjamin Amblard, Thierry Gauthier, Stephane Bertholin, Antonia Borissova, Ann Cloupet**

9:05 Paper 123c: DEM Simulation of Cylinders and Capsules in a Fluidized Bed — **Oleh Baran, Thomas Eppinger, Kuanjin Han**

9:25 Paper 123d: Application of CPFD Method in the Simulation of Horizontal Dense Phase Pneumatic Conveying of Pulverized Coal — **Yong Jin, Haifeng Lu, Xiaolei Guo, Xin Gong**

(124) Crystallization I

Thursday, Apr 26, 8:15 AM

Marriott, Crystal C
Doris Segets, Chair
Sponsored by: Particle Design

8:15 Paper 124a: Inhibition of Scale Formation By

Surfactants: Fundamentals and Applications — **Juan Tanquero**

8:35 Paper 124b: Dominant Role of Chemical Diffusion and Reaction in Shaping Particles — **Yongsheng Han, Tao Yang**

8:55 Paper 124c: Crystal Polymorphism of Particles Formed Via Monodisperse Droplet Evaporation — **Victoria Karakis, Kelly M. Carver, David Trauffer, Anna Maassel, Ryan C. Snyder**

9:15 Paper 124d: Effect of Mixing Intensity on Lysozyme Crystallization in a Meso Oscillatory Flow Reactor — **Filipa Castro, António Ferreira, José Teixeira, Fernando Rocha**

(125) Design and Analysis of Hoppers, Silos, Chutes & Feeders - Theory and Practice

Thursday, Apr 26, 8:15 AM

Marriott, Crystal B
David A. Craig, Chair
Massimo Poletto, Co-Chair
Sponsored by: Handling & Processing of Granular Systems

8:15 Paper 125a: Mixing of Freeflowing Spherical Particles in Model Cylindrical Silos with Inserts — **Faisal Manaf, Luke Fullard, Clive E. Davies**

8:37 Paper 125b: Modeling Limiting Flow Rate of Fine Powders through Hoppers — **Madhusudhan Kodam, Karl Jacob**

8:59 Paper 125c: Optimization Design of an Aerated Hopper for the Cohesive Pulverized Coal Discharge — **Haifeng Lu, Xiaolei Guo, Xin Gong**

9:21 Paper 125d: Going with the (mass) Flow: Retrofitting Screw and Hopper Insert Technology for Improved Feeding of Milled Phosphate in Egypt — **Eddie McGee, Ian Hancock**

(126) Electrification and Charge Control I (Invited Talk)

Thursday, Apr 26, 8:15 AM
Marriott, Crystal D

Tatsushi Matsuyama, Chair
Sponsored by: Particle Interactions

8:15 Paper 126a: Electrostatics of Dry Powder Aerosols for Inhalation — **Philip Kwok**

8:45 Paper 126b: Electrification and Dispersion of Particles Using Mesh Electrode — **Mizuki Shoyama, Shuji Matsusaka**

9:05 Paper 126c: Novel Electrostatic Field Meter Using Rolling Sector (first report) — **Kwangseok Choi, Teruo Suzuki**

9:25 Paper 126d: Investigation of Granular Surface Roughness Effect on Electrostatic Charge Generation — **Jun Yao, Shuo Cong, Yanlin Zhao, Chi-Hwa Wang**

(127) Experiments and Demonstrations in Particle Technology

Thursday, Apr 26, 8:15 AM

Marriott, Crystal K
Ben Freireich, Chair
Sponsored by: Education

8:15 Paper 127a: Development of Table Top Experiments in Solids Processing — **George Klinzing, Cliff Kowall**

9:00 Paper 127b: Visualization for Powder Technology Education — **Haim Kalman, Dmitry Portnikov**

(128) Particle-Fluid Reactions

Thursday, Apr 26, 8:15 AM

Marriott, Crystal M
Bruce D. Hook, Chair
Sponsored by: Applications of Solids Processing Unit Operations

8:15 Paper 128a: DIFREX Reactor and Technology Solutions for Many Particle Types and Sizes in Catalytic and Non-Catalytic Systems — **Stephen C. Arnold, P.E., Aashish Gaurav, PhD, Subhash Dutta, PhD, Jim Brenner, PhD**

8:45 Paper 128b: Erosion and Mobilisation of Highly ACTIVE Simulant Suspensions with Impinging Vertical Jets — **Joshua Croft**

9:15 Paper 128c: REAL WORLD Examples of Influences of Particles and Cake Formation on SOLID-Liquid Separation Technology Operation — **Barry A. Perlmutter**

(129) Particle Technology Applications to Pharmaceutical Continuous Processes I

Thursday, Apr 26, 8:15 AM

Marriott, Crystal L
Aditya Vanarase, Chair
Luke Schenck, Co-Chair
Sponsored by: Applications of Particle Technology for Pharmaceuticals

8:15 Paper 129a: Investigation of Different Continuous Drying Routes for Pharmaceuticals — **Manuel Kreimer, Manuel Zettl, Isabella Aigner, Stephan Sacher, Markus Krumme, Thomas Mannschott, Peter van der Wel, Albert Kaptein, Johannes G. Khinast**

8:38 Paper 129b: A Systematic Study of Liquid and Solid Residence Time Distributions in a Dynamic Baffle Crystallizer — **Claire Yiqing Liu, Alastair Barton, Paul Firth, Jonathon Speed, Dan Wood, Zoltan K. Nagy**

9:01 Paper 129c: The Axial Dispersion Performance of a Novel Oscillatory Flow Reactor with Liquid Solutions and Solids Suspensions - a Design of Experiments Approach — **Patricia Cruz, Carolina Silva, Fernando Rocha, António Ferreira**

9:23 Paper 129d: CFD Modelling of Drying and Crystalline Transformation in a Co-Current Spray Dryer — **Andrew E. Bayly, Muzammil Ali, Tariq Mahmud, Peter Heggs**

(130) Transport Phenomena and Reactor Performance I

Thursday, Apr 26, 8:15 AM

Marriott, Crystal E
Xiaotao Bi, Chair
Tingwen Li, Co-Chair
Sponsored by: Fluidization & Multiphase Flow

8:15 Paper 130a: Performance in Multi-Stage Fluidized Bed

Reactors: From Theory to Industrial Application — **Chenxi Zhang, Weizhong Qian, Fei Wei**

8:45 Paper 130b: Spray Granulation in Continuously Operated Horizontal Fluidized Beds: Investigation of the Particle Transport Behaviour and the Product Properties in a Multi-Stage System — **Eugen Diez Sr., Stefan Heinrich**

9:05 Paper 130c: Direct Numerical Simulation of Reactive Particulate Flows — **Jiangtao Lu, E.a.J.F. Peters, J.a.M. Kuipers**

9:25 Paper 130d: Investigation and Analysis of Particle Drying in a Pilot Plant Scale Vibrated Fluidized Bed — **Sören E. Lehmann, Ernst-Ulrich Hartge, Alfred Jongsma, Mariët Slagter, Fredrik Innings, Stefan Heinrich**

(131) Plenary: An Industrial Perspective on the Future Needs in Solids Processing Research and Education (Invited Talk)

Thursday, Apr 26, 10:30 AM

Marriott, Crystal G
Ray Cocco, Chair
Sponsored by: 8th World Congress on Particle Technology Plenaries

10:30 Paper 131a: An Industrial Perspective on the Future Needs in Solids Processing Research and Education — **Karl Jacob**

11:30 WCPT9 Information

12:00 Concluding Remarks

(132) Characterization of Nanoparticles II

Thursday, Apr 26, 1:30 PM

Marriott, Crystal A
Martin Morgeneyer, Chair
Sponsored by: Particle & Bulk Powder Characterization

1:30 Paper 132a: A Mobile Device for Nanoparticle Characterization By Wide-Angle Light Scattering (WALS) and Laser-Induced Incandescence (LII) — **Simon Abmann, Franz J. T. Huber, Stefan Will**

1:45 Paper 132b: Complimentary Techniques to Directly Characterize Liposomes: Nanoparticle Tracking Analysis, Dynamic Light Scattering, and Electrophoretic Light Scattering — **Ragy Ragheb, Graham J. Taylor, Nima Tamaddoni, Ulf Nobbmann, Duncan Griffiths**

2:00 Paper 132c: Multiwavelength Analytical Ultracentrifugation – Simultaneous Analysis of Hydrodynamic and Optical Properties — **Simon E. Wawra, Johannes Walter, Peter J. Sherwood, Walter F. Stafford III, Wolfgang Peukert**

2:15 Paper 132d: In Situ Deformation and Breakage of Sol-Gel Derived Oxide Particles inside a SEM — **Stefan Romeis, Patrick Herre, Jan Schwenger, Mirza Mačković, Thomas Przybilla, Erdmann Spiecker, Wolfgang Peukert**

2:30 Paper 132e: Size and Polydispersity of a Nanoparticle Reference Material By Dynamic Light Scattering — **Ulf Nobbmann, Ana Morfesis**

2:45 Paper 132f: A Comprehensive Brownian Dynamics Based Forward Model for Analytical (Ultra) Centrifugation — **Thaseem Thajudeen, Maximilian Uttinger, Johannes Walter, Simon E. Wawra, Wolfgang Peukert**

(133) Computational Methods for Industrial Fluidization Applications & Process Scale-Up II

Thursday, Apr 26, 1:30 PM

Marriott, Crystal F
Ben Freireich, Chair
Tingwen Li, Co-Chair
Sponsored by: Fluidization & Multiphase Flow

1:30 Paper 133a: Scale up Practices for Today's Breakthrough Technologies — **Carlo Badiola, Charles Costenbader, Matthew A. Hamilton, John Pendergrass, Peter Blaser, Reddy Karri, Ted Knowlton, Ben Freireich, Ray Cocco**

1:48 Paper 133b: Study of FCC Riser Hydrodynamics Using CFD Tools — **Lev Davydov, Reza Mostofi, Azita Ahmadzadeh**

2:06 Paper 133c: Investigation of Particle Sheeting of Monodisperse Particles with an Euler-Euler Two-Fluid Model Incorporating Electrostatic Charging Effects — **Manjil Ray, Fahad Chowdhury, Andrew Sowinski, Poupak Mehrani, Alberto Passalacqua**

2:24 Paper 133d: Large-Scale DEM-CFD Method for an Industrial Fluidized Bed — **Yuki Mori, Mikio Sakai**

2:42 Paper 133e: Predicting Performance of Industrial FCC Regenerator Using Computational Fluid Dynamics — **Raj Singh, Eusebius Gbordzo, Benjamin Amblard, Ludovic Raynal**

(134) Crystallization II

Thursday, Apr 26, 1:30 PM

Marriott, Crystal C
Yongsheng Han, Chair
Sponsored by: Particle Design

1:30 Paper 134a: Optimization of Process Parameters of Quantum Dot Synthesis Aided By High-Throughput Experimentation and Big Data Techniques — **Ahmed M. Salaheldin, Doris Segets**

1:50 Paper 134b: Hydrodynamics and Mixing Dynamics in Droplet-Based Microfluidics for Protein Crystallization — **Joana Ferreira, Filipa Castro, Fernando Rocha, Simon Kuhn**

2:10 Paper 134c: Continuous Fluidic Fabrication of Uniform Spherical Aggregates for Controlled Dissolution — **Ales Zadrazil, Frantisek Stepanek, Martin Kalny**

2:30 Paper 134d: Synthesis of Spherical Particles with a Targeted Size Distribution — **Andrea Valentini, Sylvain Martin, Olivier Bonnefoy**

(135) Drying Applications
Thursday, Apr 26, 1:30 PM

Marriott, Crystal M
Andrew E. Bayly, Chair
Sponsored by: Applications of Solids Processing Unit Operations

1:30 Paper 135a: The Effect of Drying on the Metal Distribution of Supported Catalysts with High Metal Loadings — **Cody Bishop, Anusha Noorithaya, Prateek Sarkar, Benjamin Glasser, Johannes G. Khinast**

1:52 Paper 135b: Online Pellet Drying for Inline Polymer Analysis — **Bruce D. Hook, Robert Nielsen, Birgit Braun, Shrikant Dhodapkar**

2:14 Paper 135c: Short-Time Hydrothermal Sterilization of Thermally-Labile Powders — **Gene Lam, Erich Windhab**

(136) Electrification and Charge Control II

Thursday, Apr 26, 1:30 PM

Marriott, Crystal D
Tatsushi Matsuyama, Chair
Sponsored by: Particle Interactions

1:30 Paper 136a: Influence of Electrostatic Charges on the Particle Concentration in Wall-Bounded Turbulent Flows — **Holger Grosshans, Laura Villafaña, Andrew Banko, Christopher Elkins, John K. Eaton, Miltiadis V. Papalexandris**

1:50 Paper 136b: Powder Electrification Due to Pneumatic Conveying — **Milad Taghavivand, Andrew Sowinski, Poupak Mehrani**

2:10 Paper 136c: Modeling of Electrostatic Charging of Particles in a Shaker — **Tatsushi Matsuyama, Yuki Mabuchi, Junichi Ida**

2:30 Paper 136d: Parametric Study for the Development of a Particle-Particle Collisional Charging Model for Use in the CFD Simulation of Electrostatic Effects in Gas-Solid Fluidized Beds — **Fahad Chowdhury, Manjil Ray, Andrew Sowinski, Poupak Mehrani, Alberto Passalacqua**

(137) Instrumentation, Control and Measurement Systems in Bulk Solids Systems in Processing Plants

Thursday, Apr 26, 1:30 PM

Marriott, Crystal B
Clive E. Davies, Chair
Tim Freeman, Co-Chair
Sponsored by: Handling & Processing of Granular Systems

1:30 Paper 137a: Digital Image Spectroscopy an Innovative Approach for Particle and Bulk Powder Characterization — **Giuseppe Bonifazi, Silvia Serranti**

1:52 Break

2:14 Paper 137c: Efficiency of Different Flame Arresters Designs for Dust Explosions — **Ignacio Garrido Ceca Sr.**

2:36 Paper 137d: Interpretation of Shear Cell Results Using Various Yield Locus Curve Fitting Approaches — **Shoucheng Du, Massih Pasha**

(138) Particle Technology Applications to Pharmaceutical Continuous Processes II

Thursday, Apr 26, 1:30 PM

Marriott, Crystal L
Aditya Vanarase, Chair
Luke Schenck, Co-Chair
Sponsored by: Applications of Particle Technology for Pharmaceuticals

1:30 Paper 138a: Quality By Control of Dry Granulation Process for Continuous Tablet Manufacturing — **Sudarshan Ganesh, Mariana Moreno, Qinglin Su, Zoltan K. Nagy, Gintaras Reklaitis**

1:52 Paper 138b: Twin Screw Granulation: A Step Towards Continuous Processing — **Rachael Shinebaum, Andrew Ingram, Hannah K. Batchelor, Gavin K. Reynolds, Ian Gabbott**

2:14 Paper 138c: A Novel Metrology for Polymodal Particle Size Distributions and Its Beyond Application in Twin Screw

Granulation — **Carlota Mendez Torrecillas, Gavin W. Halbert, Dimitrios A. Lamprou**

(139) Transport Phenomena and Reactor Performance II

Thursday, Apr 26, 1:30 PM

Marriott, Crystal E
Xiaotao Bi, Chair
Hamid Arastoopour, Co-Chair
Sponsored by: Fluidization & Multiphase Flow

1:30 Paper 139a: CFD Analysis of CO₂ Removal Using an Amine-Based Solid Sorbent — **Farnaz Esmaeili Rad, Hamid Arastoopour**

1:48 Paper 139b: Direct Numerical Simulation of Flow and Mass Transfer in Complex Geometries Using a Coupled Volume of Fluid and Immersed Boundary Method — **Lei Yang, M.W. Baltussen, E.a.J.F. Peters, L. Fries, Y. Harshe, J.a.M. Kuipers**

2:06 Paper 139c: Computational Study on Biomass Fast Pyrolysis: Hydrodynamic Effects in a Laboratory-Scale Fluidized Bed — **Emilio Ramirez, Tingwen Li, Mehrdad Shahnam, Akhilesh Bakshi, C. Stuart Daw, Charles E. A. Finney**

2:24 Paper 139d: Kinetics Study and Its Implementation in a First Principles Model for the Riser of a Resid Fluid Catalytic Cracking Unit — **Mohammad Rakib, Mustafa Karakaya, Gnana Pragasam Singaravel, Abdul Majed Al Katheeri, Syed Basheer, Mohamed AlMusharfy, Mabruk Issa Suleiman, Stepan Spatenka**

2:42 Paper 139e: The Influence of Meso-Scale Flow Structure on Transport Phenomena in a Circulating Fluidized Bed — **Baolin Hou**

(140) Combustible Dust Hazards and Their Mitigation I

Tuesday, Apr 24, 1:30 PM

Marriott, Grand Ballroom 7A
Jérôme Taveau, Chair
Susan Bershad, Co-Chair
Sponsored by: Combustible Dust Safety

TECHNICAL SESSIONS

1:30 Paper 140a: How to Conduct a Dust Hazards Analysis (DHA) — **Michelle Murphy, Matthew Borene**

2:00 Paper 140b: Combustible Dust Management Screening: Methodology and Tool Development — **Sean Classen, Merrill Childs, Rene Murata**

2:30 Paper 140c: Risk-Based Dust Hazard Analysis (DHA) — **Fuman Zhao**

(141) Combustible Dust Hazards and Their Mitigation II

Tuesday, Apr 24, 3:30 PM
Marriott, Grand Ballroom 7A
Jérôme Taveau, Chair
Susan Bershadt, Co-Chair
Sponsored by: Combustible Dust Safety

3:30 Paper 141a: Metal Powder and Nanoparticles: Combustible Dust Safety Challenges? — **Gerd Mayer**

4:00 Paper 141b: Electrostatic Hazards during Pneumatic Conveying of Combustible Dusts in Flexible Hoses — **Michael Stern, Sean J. Dee, Alfonso F. Ibarreta, Russell Ogle, Timothy J. Myers**

4:30 Paper 141c: Experimental and Theoretical Investigation of the Lower Explosion Limit of Multi-Phase Hybrid Mixtures — **Emmanuel K. Addai, Paul R. Amyotte, Ulrich Krause**

(142) Tutorials in Process Safety - LPS II

Wednesday, Apr 25, 10:15 AM
Marriott, Grand Ballroom 8B
David A. Moore, Chair
Gregg Kiihne, Co-Chair
Sponsored by: Combustible Dust Safety

10:15 Paper 142a: Classical References for the Testing and Identification of Combustible Dust Hazards — **Larry D. Floyd**

10:45 Paper 142b: Analysis of Dust Concentration Measurements Taken during the Filling Process of a Silo — **Lahiru Lakshan Lulbadda Waduge, Stefan Zigan, Pablo Garcia Triñanes**

11:15 Paper 142c: The Design and Operation of Multi-Point Dust Collection Systems — **Yi Fan, Karl Jacob, James F. Koch**

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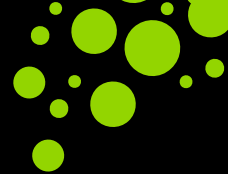
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**Presenting paper on
“DIFREX Nexgen Expands and Advances
Reactor and Technology Solutions”
Boston Room, April 24, 9:06 AM**

**Presenting paper at 8th World Congress on Particle Technology
“DIFREX Reactor and Technology Solutions for Many Particle Types and
Sizes in Catalytic and Non-Catalytic Systems”
Crystal Ballroom M, April 26, 8:15 AM**



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February 17–19, 2019
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Chemical Engineering Practice

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6th CCPS China Conference on Process Safety

September 25–27, 2018
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