PTF Newsletter

Particle Technology Forum

AMERICAN INSTITUTE OF CHEMICAL ENGINEERS

Vol. 12 No. 2 Spring 2007

The PTF is an international and interdisciplinary forum that promotes information exchange, scholarship, research, and education in the field of particle technology – that branch of science and engineering dealing with the production, handling, modification, and use of a wide variety of particulate materials, both wet or dry, in sizes ranging from nanometers to centimeters. Particle technology spans a range of industries to include chemical, petrochemical, agricultural, food, pharmaceuticals, mineral processing, advanced materials, energy, and the environment. See www.erpt.org/ptf for more information.

In this issue…

LETTER FROM THE CHAIR

For the next two years, I will have the privilege and honor to preside over as the chair of Particle Technology Forum – a vibrant organization which derives its membership from many disciplines. Through the years, we have continued to grow as a community because we have embraced new emerging areas as our own (e.g., Nanoparticle Technology, Energetics). We have also successfully collaborated with other groups within AIChE (e.g., Pharmaceuticals, Food, Separations, Mixing) to bring people with shared interests within our fold. We have also shown leadership on the international front through successful organization of the Fifth World Congress on Particle Technology (2006).

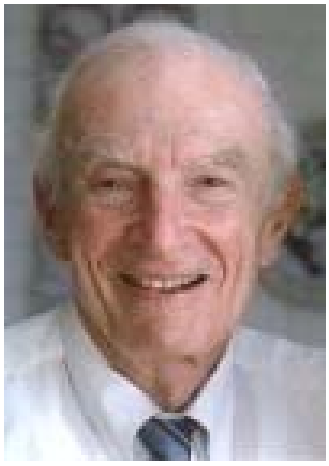
With the help of my co-chair (Professor Hugo Caram), the PTF Executive Committee and the Group Chairs, I am confident that we will continue to build upon our successes.

For long term success, I think that we have to take a two-pronged approach. First of all, we have to be cognizant of the current interests and needs of our membership. There is also a clear need to find the next generation of leaders and increase participation amongst the newer membership to create a greater sense of ownership. Secondly, we have to seek out avenues for growth in newer areas, such as energy and nanoscale engineering. I urge all of you to think about common areas of interest and ways we can collaborate with these emerging divisions.

I would like to express my sincere appreciation for ***Al Weimer*** for his services to our community as the outgoing chair of Particle Technology Forum. Through his relentless drive, energy, dedication and passion he has championed the cause of PTF on every front. Personally, I admire him for leading by example and through his actions. We thank him for his leadership and vision, and we hope that he will continue to let us borrow his "crystal ball."

Shrikant Dhodapkar
PTF Chair

In Memoriam



It is with great sadness that we share with you the news of Sheldon Friedlander's passing on February 9 in his Pacific Palisades home. Professor Friedlander was a member of the National Academy of Engineering and received the 1990 Fuchs Memorial Award from the International Committee representing the U.S., European and Japanese associations for research on aerosol science and technology. In 1984-85 he received a Senior U.S. Scientist Award (Humboldt Award) from the West German Government and is a past president of the American Association for Aerosol Research. During his career he received a Fulbright Scholarship, a Guggenheim Fellowship, the Colburn, Alpha Chi Sigma and Walker Awards from the American Institute of Chemical Engineers (AIChE), and a certificate of recognition from NASA. He received the 1995 Lawrence K. Cecil Award in Environmental Chemical Engineering from AIChE. In 2000 Dr. Friedlander received the Junge Award for his research contributions and pioneering work in the field of aerosol science.

Particulate Processes in the Pharmaceutical Industry II

Particulate Processes in the Pharmaceutical Industry

February 3-8, 2008

San Juan, Puerto Rico

http://www.engconfintl.org/8ap.html

Conference Chair: Jennifer Sinclair Curtis, University of Florida (jcurtis@che.ufl.edu)

Electronic Abstract Submission opens April 1, 2007

JOB POSTINGS

As a new feature available to all members of PTF, future newsletters will include a listing of open industrial, government, and academic positions. If you would like to advertise such a position in an upcoming newsletter, please email a short, one-paragraph description of the position and relevant contact information to Professor Christine Hrenya (hrenya@colorado.edu). Newsletters are published twice per year, generally in the September/October and February/March time frames.

Particle ALD Postdoctoral Research Associate Position – University of Colorado

Applications are sought for a recent Ph.D. to carry out research in the area of fine particle functionalization by Atomic Layer Deposition (i.e. Particle ALD). Candidates should have an interest in the area of particle technology, fluidization, and particle coating processing. Experience with fluidization, AFM, particle surface modification, or the fabrication of ceramic parts and their evaluation is beneficial. A Ph.D. in chemical engineering, materials science, or chemistry is preferred. The research includes in-situ synthesis of nanopowders followed by ALD surface functionalization and composite product synthesis/evaluation. Some new ALD chemistry will be applied. The impact of surface modification on interparticle forces may be investigated. Please send your complete vitae and a list of references to Prof. Alan (Al) Weimer (alan.weimer@colorado.edu). Please visit the "Team Weimer" web site at http://www.colorado.edu/che/TeamWeimer/index.htm for further information. A start date is flexible, but preferably in the summer or early fall, 2007.

2007 AIChE Annual Meeting

November 4-9, 2007
Salt Lake Convention Center
Salt Lake City, UT
URL: http://www.aiche.org/Conferences/AnnualMeeting/index.aspx

PTF Session	Chair	Co-Chair
Particle Technology Forum (Area 3)		
03000 Particle Technology Award Lectures	Shrikant Dhodapkar Phone Number: 979-238-7940 Email: sdhodapkar@dow.com	Hugo S. Caram Phone Number: 610-758-4259 Email: hsc0@lehigh.edu
03000 Particle Technology Forum Poster Session	Manuk Colakyan Phone Number: 304-747-4580 Email: M.Colakyan@dow.com	Hugo S. Caram Phone Number: 610-758-4259 Email: hsc0@lehigh.edu
Particle Production and Characterization (3a)		
Agglomeration and Granulation Processes	Paul Mort Phone Number: 513-627-8876 Email: mort.pr@pg.com	Gabriel I. Tardos Phone Number 212-650-6665 Email: tardos@ccny.cuny.edu
Applications of Engineered Structured Particulates	Christopher L. Kitchens Phone Number: 864-656-5419 Email: ckitche@clemson.edu	
Characterization of Engineered Particles and Nano-Structured Particles	Mark Bumiller Phone Number 508-480-0200, ext 222; Email: mark.bumiller@malvernusa.com	Dr. Caroline Nam Laufer Phone Number: 302-831-2543 Email: nam@udel.edu
Comminution – Experiments, Theory and Modeling	R. Bertrum Diemer, Jr. Phone Number: 302-774-2232 Email: r-bertrum.diemer@usa.dupont.com	Ecevit Bilgili Phone Number 215-652-9824 Email: ecevit_bilgili@merck.com
Continuous Particle Processing and Pat Applications	Ecevit Bilgili Phone Number 215-652-9824 Email: ecevit_bilgili@merck.com	Mark Bumiller Phone Number 508-480-0200, ext 222; Email: mark.bumiller@malvernusa.com
Dynamics and Modeling of Particles, Crystals and Agglomerate Formation	Jan Sefcik Phone Number: +44-141-5482410 Email: jan.sefcik@strath.ac.uk	Roger Place Phone Number: +44-1740-620688
Particle Formation and Crystallization Processes from Liquids, Slurries and Emulsions	Patrick T. Spicer Phone Number: 513-634-9628 Email: spicer.pt@pg.com	Priscilla J. Hill Phone Number: 622-325-8249 Email: phill@che.msstate.edu
Particle Formation in Supercritical Fluids for Food and Pharmaceuticals	Jun Yang Phone Number: 973-596-5466 Email: yangjun@adm.njit.edu	Rajesh Dave Phone Number: 973-596-5860 Email: dave@adm.njit.edu

Population Balance Modeling for Particle Formation Processes: Nucleation, Aggregation and Breakage Kernels	Roger Place Phone Number: +44-1740-620688 Email: rogerplace@compuserve.com	Edward P. Gatzke Phone Number: 803-777-1159 Email: gatzke@sc.edu
Fluidization and Fluid-Particle Systems (3b)		
Applications of Fluidization	Manuk Colakyan Phone Number: 304-747-4580 Email: m.colakyan@dow.com	Ray A. Cocco Phone Number: 989-631-1166 Email: ray.cocco@psrichicago.com
Bio-Refining and Bio-Fuels in Fluidization and Fluid-Particle Systems	Alan Weimer Phone Number: 303-492-3759 Email. weimera@colorado.edu	L.S. Fan Phone Number: 614-292-4935 Email: fan.1@osu.edu
Circulating Fluidized Beds	Jesse Zhu Phone Number: 519-661-2111 Email: jzhu@uwo.ca	Bruce D. Hook, Sr. Phone Number: 979-238-1291
Computational and Numerical Approaches to Particle Flow	Jennifer S. Curtis Phone Number: 352-392-0882 Email: jcurtis@che.ufl.edu	Pedro E. Arce Phone Number: 931-372-3297 Email: parce@tntech.edu
Energy Systems in Fluidization and Fluid-Particle Systems	Kimberly H. Henthorn Phone Number: 573-341-7633 Email: henthork@umr.edu	Ah-Hyung Park Phone Number 614-292-4935 Email: park.476@osu.edu
Fundamentals of Fluidization	Ray A. Cocco Phone Number: 989-631-1166 Email: ray.cocco@psrichicago.com	Jesse Zhu Phone Number: 519-661-2111 Email: jzhu@uwo.ca
The Fluidized Bed Reactor	Zoran R. Jovanovic Phone Number: 989-638-1355 Email: zjovanovic@dow.com	Ray A. Cocco Phone Number: 989-631-1166 Email: ray.cocco@psrichicago.com
Transport in Fluidized Systems	T. C. Ho Phone Number: 409-880-8790 Email: hotc@hal.lamar.edu	Yi Cheng Phone Number: 86-10-62794468 Email: yicheng@tsinghua.edu.cn
Tutorial on Emerging Technologies in Fluidization and Fluid-Particle Systems	Ray A. Cocco Phone Number: 989-631-1166 Email: ray.cocco@psrichicago.com	Jesse Zhu Phone Number: 519-661-2111 Email: jzhu@uwo.ca
Solids Flow, Handling and Processing (3c)		
Dynamics and Modeling of Particulate Systems I	James F. Gilchrist Phone Number: 610-758-4781 Email: gilchrist@lehigh.edu	German Drazer Phone Number: 410-516-0170 Email: drazer@jhu.edu
Dynamics and Modeling of Particulate Systems II	James F. Gilchrist Phone Number: 610-758-4781 Email: gilchrist@lehigh.edu	German Drazer Phone Number: 410-516-0170 Email: drazer@jhu.edu
Memorial Session Honoring Andrew Jenike	John Carson Phone Number: 978-392-0300 Email: jwcarson@jenike.com	Karl Jacob Phone Number: 989-636-5706 Email: jacobkv@dow.com
Panel Discussion on Silo Design	Shrikant Dhodapkar Phone Number: 979-238-7940 Email: sdhodapkar@dow.com	Ben Glasser Phone Number: 732-445-4243 Email: bglasser@soemail.rutgers.edu
Piloting and Scale-up of Particle Processes	Bruce D. Hook, Sr. Phone Number: 979-238-1291 Email: bdhook@dow.com	Jim Davis Email: davis.jl.2@pg.com

Solids Handling and Processing	Clive E. Davies Phone Number: 64-6-356-9099 Email: c.davies@massey.ac.nz	Hugo S. Caram Phone Number: 610-758-4259 Email: hsc0@lehigh.edu
Nanoparticles (3d)		
Functional Nanoparticles and Nanocoatings on Particles I	Lutz Madler Phone Number: 310-500-8736 Email: lutz@seas.ucla.edu	George Fotou Phone Number: 505-563-4275 Email: george_fotou@cabot-corp.com
Functional Nanoparticles and Nanocoatings on Particles II	Sotiris Pratsinis Phone Number: 1-632-3180 Email: pratsinis@ptl.mavt.ethz.ch	Alan Weimer Phone Number: 303-492-3759 Email: weimera@colorado.edu
Gas Phase Synthesis of Nanoparticles	Wendelin J. Stark Phone Number: 411-632-0980 Email: wendelin.stark@chem.ethz.ch	
Health and Environmental Effects of Nanoparticles	Wendelin J. stark Phone Number: 411-632-0980 Email: wendelin.stark@chem.ethz.ch	Lutz Madler Phone Number: 310-500-8736 Email: lutz@seas.ucla.edu
Liquid-Phase Synthesis of Nanomaterials and Particles	Jan Sefcik Phone Number: +44-141-5482410 Email: jan.sefcik@strath.ac.uk	Christopher L. Kitchens Phone Number: 864-656-5419 Email: ckitche@clemson.edu
Modeling and Scaleup of Nanoparticle Processing	Roger Place Phone Number: +44-1740-620688 Email: rogerplace@compuserve.com	Herbert Riemenschneider Phone Number: 251-443-2400 Email: herbert.riemenschneider@degussa.com
Nanoparticles for Drug Delivery	Jesse Zhu Phone Number: 519-661-2111 Email: jzhu@uwo.ca	Yangchuan Xing Phone Number: 573-341-6772 Email: xingy@umr.edu
Panel Discussion – Industrial Scaleup of Nanoparticles and Systems	Roger Place Phone Number: +44-1740-620688 Email: rogerplace@compuserve.com	Yangchuan Xing Phone Number: 573-341-6772 Email: xingy@umr.edu
Strength and Breakage of Nanoagglomerates	Roger Place Phone Number: +44-1740-620688 Email: rogerplace@compuserve.com	Pratim Biswas Phone Number: 314-935-5482 Email: pratim.biswas@seas.wustl.edu
Energetics (3e)		
Environment & Lifecycle Issues Related to Energetic Materials	Charles R. Painter Phone Number: 301-744-6772 Email: charles.r.painteer@navy.mil	Bruce Cranford Phone Number: 301-340-0052 Email: bruce-cranford-pe@comcast.net
Nano-Energetic Materials	Charles R. Painter Phone Number: 301-744-6772 Email: charles.r.painter@navy.mil	Bruce Cranford Phone Number: 301-340-0052 Email: bruce-cranford-pe@comcast.net
Processing and Safety of Energetic Materials	Dilhan Kalyon Phone Number: 201-216-8225 Email: dkalyon@stevens.edu	Bruce Cranford Phone Number: 301-340-0052 Email: bruce-cranford-pe@comcast.net

2007 AIChE Call for Papers

To Prospective Participants of the 2007 AIChE Annual Meeting in Salt Lake City:

It is with great excitement and anticipation that we have opened the Call for Papers for the 2007 Annual Meeting in Salt Lake City, Utah, November 4 - 9, 2007. In addition to what is shaping up to be one of the most comprehensive Annual Meeting programs, we are also looking forward to a new AIChE annual meeting venue at the Salt Palace Convention Center in downtown Salt Lake City. The Salt Lake City venue is particularly aligned with AIChE programming and meeting needs. In addition, Salt Lake City is a must-visit location for meeting participants and guests.

We are now seeking your submissions to present. Please go to

http://www.aiche.org/Conferences/AnnualMeeting/index.aspx

where you will see the Call for Papers link in the center of the page.

Note that there is a firm closing date of May 14th, 11:59pm 2007. We will adhere to this closing and will send several messages during the open call as reminders.

As part of the submittal process, you will be asked to complete a very simple survey that will take less than 5 minutes. With Energy a primary theme for the 2007 meeting, this investment in time will enable AIChE to identify papers relevant to energy on the meeting website and in the meeting Program Book. These additional questions will also enable AICHE to determine whether there are significant energy related programming areas that are being under-programmed.

So, don't wait. Submit today and please distribute this call for papers widely.

We look forward to your participation in the 2007 AIChE Annual Meeting in Salt Lake.

Sincerely,

Jim Davis, UCLA, Meeting Program Chair
Vince Grassy, Air Products and Chemicals, Inc., Meeting Program Co-Chair

Call for PTF Award Nominations

Send nominations to the Particle Technology Forum Awards Committee Chair,
Prof. Hugo S. Caram
Department of Chemical Engineering
Lehigh University
111 Research Drive
Bethlehem, PA 18015
Email: Hugo.Caram@lehigh.edu
Phone: 610-758-4259
Fax: 610-758-5057

Deadline: May 15th, 2007

For more information, please visit the website:
http://www.aiche.org/About/Awards/Division.aspx

BEST PH.D. IN PARTICLE TECHNOLOGY AWARD

Sponsor: Procter and Gamble Company

Description: Recognizes an outstanding dissertation by an individual who has earned a doctoral degree. The dissertation can be in any discipline in the physical, biomedical or engineering sciences, but must be in particle science and engineering. Selection criteria include:
1. An outstanding original dissertation with relevance to particle technology.
2. The candidate must have received a doctoral degree within the last three calendar years prior to the year the award is given.

Nomination: Nominations can be made by any member of the Particle Technology Forum. Nominations should include
1) a letter of nomination
2) an extended abstract of up to six pages including a list of refereed publications resulting directly from that dissertation
3) no more than three supporting letters, all of which must be from institutions outside the one granting the dissertation
4) at least one letter from industry
5) The letter of nomination should include a critical review stating the value of the dissertation in terms of its originality, significance, and potential applications in the field of particle science and technology. The supporting letters may focus on any of these attributes.

Award: A plaque and a $500 honorarium.

Presentation: The award is presented at a Forum sponsored event during the AIChE Annual Meeting.

Past Recipients:

2006 Griselda Bonilla
2005 Stephen Conway
2004 Ecevit Bilgili
2003 Stephen Tallon
2002 Himanshu Gupta
2000 H. Shinto
1999 R. Agnihotri
1998 P. Spicer
1997 C. M. Hrenya

FLUIDIZED PROCESSING RECOGNITION AWARD

Sponsor: Dow Chemical Company Foundation

Description: Recognizes a Forum member who has made significant contribution to the science and technology of fluidization or fluidized processes, and who has shown leadership in the engineering community.

Deadline: Awarded bi-annually in odd numbered years. Next award year is 2007.

Award: A plaque and a $500 honorarium.

Presentation: The award is presented bi-annually at a Forum sponsored event during the AIChE Annual Meeting.

Past Recipients:

2005 M. Colakyan
2003 H. Arastoopour
2001 D. King
1999 J. Chen
1997 A. W. Weimer
1995 L. Fan
1994 T. Allen
1993 W. Yang

PARTICLE TECHNOLOGY FORUM AWARD

Sponsor: E.I. duPont de Nemours & Company

Description: Recognizes outstanding contributions in the field of particle technology, teaching of particle technology (as evidenced by the aggregate contributions of the nominee's PhD students to the field) and the advocacy of particle technology within industry, academia, and government.

Nomination: Nomination package should include nomination letter, detail biographical information, summary of significant contributions to particle technology and at least three supporting letters.

Award: A plaque and $1,000 honorarium.

Presentation: The award is normally presented at a Forum sponsored event at the AIChE Annual Meeting.

Past Recipients:

2006 Douglas Fuerstenau
2005 Joerg Schwedes
2004 George Klinzing
2003 Chi Tien
2002 Brian Kaye
2001 S. K. Friedlander
2000 B. Scarlett
1998 A. W. Jenike
1997 R. Davies
1996 K. Leschonski
1995 R. Pfeffer

LECTURESHIP AWARD IN FLUIDIZATION

Sponsor: Fluor Foundation

Description: Recognizes an individual's outstanding scientific/technical research contributions with impact in the field of fluidization and fluid-particle flow systems. Selection criteria include:

1. An outstanding contribution advancing fluidization or fluid-particle flow systems.

2. The awardee is required to deliver a keynote paper at the Fundamentals of Fluidization and Fluid-Particle Systems session of Area 3b during the AIChE Annual Meeting. The awardee is also required to submit a written manuscript. 3. Membership in the Particle Technology Forum or AIChE is not required.

Nomination: Nomination package should include nomination letter, detail biographical information and at least three supporting letters.

Award: A plaque and a $1,000 honorarium.

Presentation: The award is presented at a Forum sponsored event during the AIChE Annual Meeting.

Past Recipients:

2006 Yong Jin	2005 S. Mori
2004 Ye Mon Chen	2003 Norman Epstein
2002 Dimitri Gidaspow	2001 M. Horio
2000 W. Yang	1999 H. Arastoopour
1998 J. Werther	1997 M. Kwauk

Thomas Baron Award in Fluid-Particle Systems

Sponsor: Shell Global Solutions (US)

Description: Recognizes an individual's outstanding scientific/technical accomplishment which has made a significant impact in the field of fluid-particle systems or in a related field with potential for cross-fertilization. Selection criteria include: 1. An outstanding contribution advancing fluid-particle systems, or a related field. 2. The awardee is invited to deliver a Plenary Lecture at an AIChE Annual Meeting session. The awardee is also required to submit a written manuscript.

Nomination: Nomination package should include nomination letter, detail biographical information and at least three supporting letters.

Award: A plaque and $1,000.

Presentation: The award is presented at a Forum sponsored event at the AIChE Annual Meeting.

Past Recipients:

2006 Dimitri Gidaspow	2005. S. Sundaresan
2004 D. Ramakrishna	2003 Sotiris Pratsinis
2002 Darsh Wasan	2001 L. White
2000 R. Pfeffer	1998 S.L. Soo
1997 R. C. Flagan	1996 D. D. Joseph
1995 J. C. Chen	1994 L. Fan
1993 R. Jackson	

2006 PTF Awards Lecture

2006 PARTICLE TECHNOLOGY FORUM AWARD TALK

AIChE Annual Meeting, San Francisco, November 15, 2006

Douglas W. Fuerstenau
University of California
Berkeley, CA 94720

I wish to thank the committee for selecting me for the 2006 Particle Technology Forum Award. I have known almost all of the prior recipients, several quite well. Unfortunately, three whom I knew very well are no longer with us.

Particles have had a major role in the course of my life, right from the beginning. My first half dozen years were spent on a farm in eastern South Dakota. This was the era of the Dust Bowl, which you must have seen pictures of. I remember playing in drifts of free-flowing dust particles, probably 100 microns in diameter. Along the fences there were drifts of well-classified dirt particles like snowdrifts in the winter. My guess is the 10-micron particles had blown over to Minnesota and the submicron particles darkened the air all the way to Chicago. This all came about because in World War I, the Bosphorus was closed to shipping wheat. When the price of wheat soared to $5 or $6 per bushel in 1915, the grasslands of eastern Montana, the western Dakotas, Oklahoma etc. were plowed and planted into wheat. Those were wet years, but as we all know, weather cycles and about 1930 the rains stopped and without the former grass cover, the Dust Bowl started. My parents lost the farm – this was unfortunate for them but fortunate for me.

Generally, chemical engineering ignored solid particles in past decades. In the 1960s, I attended a symposium marking the 25th anniversary of the Chemical Engineering Department at UC Berkeley. In opening the symposium, Charles Tobias, Chairman of the Department, defined chemical engineering "as that field of technology concerned with the processing of material – in fluid form." Since chemical engineering was dominated by the petrochemical industries, it was the people in industries involved with the processing of solids, mainly mineral processing but also cement production and ceramics, that made much of the headway in particle technology in those days. However, in the 1960s a couple of times, I organized a symposium on crushing and grinding at AIChE Annual Meetings with John Axelson, who had conducted the research for his PhD in chemical engineering at Minnesota on particle breakage in the 1940s. Although much of the chemical industry dealt with solid particles, the field received limited attention in chemical engineering research. It was Reg Davies who worked at overcoming this general lack of interest by AIChE, while at DuPont. In 1992, Reg called 20 or 30 of us to together for a workshop in Washington DC that led to the formation of the Particle Technology Forum. The great success of that effort is evident by the number of papers involving solid particles at this Meeting.

Except for fluidized bed technology, nearly all of the developments in large-scale particle processing started in the mineral industry where ores must be ground fine enough to separate the desired mineral particles from waste rock. This includes the unit operations for size reduction and size control, solid-solid separations, water-solid separations, and size enlargement. Research by mineral processing engineers laid down the basic principles involved in the behavior of particles in processing systems.

My own research with solid particles has been three-fold: the unit operations involved in mineral processing, the surface chemistry of particles in water, and particle science and technology itself. Two areas that I have continued to work on over my entire career have been surfactant adsorption phenomena on solids and on comminution. However, a succession of graduate students worked extensively on several other topics, such as comminution modeling, pelletizing, solids mixing and transport in rotating drums, metal recovery from deep-sea manganese nodules, flotation, electrokinetic phenomena, colloid stability, control of wettability by electrochemical methods, the oxidation and desulfurization of coal. Our group was primarily interested in processing solid particles, but I always insisted that experiments be carried out with well-characterized materials and pure reagents, and because of this, the results of our research have been long lasting.

Three people played major roles in my background. The first was Professor A.M. Gaudin at MIT, under whom I did my graduate research, and then Professor Theo Overbeek from Utrecht, who spent a year in our group during my final year as a graduate student, and later Professor Hans Rumpf from Karlsruhe. Both Gaudin and Overbeek were part of my educational background whereas Rumpf later played more of an inspirational role. Professor Gaudin made many early, major contributions to flotation and to comminution. Professor Overbeek, as many of you know, is one of the world's giants in colloid science, being the "O" in the DLVO theory. Overbeek gave me a solid background in electrical double layer phenomena.

Professor Gaudin played an important role for engineering research in another way. In the early 1960s he was chairman of the Engineering Foundation – during which time all of their funds were first directed towards establishing the National Academy of Engineering and then to initiating the Engineering Foundation Research Conferences.

In 1963, I was asked to organize an Engineering Foundation Conference on comminution, one of their first four. I had gone to my first international congress in Europe in June, and when I returned in early July, my right-hand assistant Andy Mular told me that we had seven registrants. After breaking out in a cold sweat, I got on the telephone and wrote a lot of letters and when the Conference was held in August we had about 70 or so in attendance, the largest number for several years. Subsequently, we decided to call the series of conferences, *"Particulate Systems,"* and our next conference was held in 1966 in Milwaukee under the chairmanship of Tom Meloy. It was at this conference that I first met Hans Rumpf. These Engineering Foundation conferences have continued internationally over the last forty years, covering a wide range of particle technology topics, and have serve to disseminate technical knowledge and foster professional interaction between participants.

The criteria for the Particle Forum Technology Award mentions students and the role of one's students in furthering particle technology. I thank my many former students who helped make this award possible for me. A year ago, through the input of former students, an academic PhD tree was assembled and it lists 60 PhDs, 156 grandstudent PhDs, and 87 great-grandstudent PhDs. It's a real pleasure to meet one's grandstudents and great-grandstudents. Brij Moudgil, the Director of the Engineering Research Center on Particle Science and Technology at the University of Florida is one of my grandstudents. I am proud that 24 of my former students chose an academic career, some for a short time but many for their full professional careers. Several of my grandstudents are distinguished professors around the world, teaching is aspects of mineral processing and particle technology.

Many of my students have made major contributions to education and research in particle technology. Just to mention a few as examples, these include P. Somasundaran, now at Columbia, a leader in surfactant and polymer adsorption on particles in aqueous media; P.C. Kapur, retired from IIT Kanpur, who conducted the initial work on mechanisms and modeling pellet growth in agglomeration and later made many major contributions to modeling particulate systems; Dick Hogg, retired from Penn State, who carried out pioneering research on mixing of particulates and whose master's thesis became the seminal theory on modeling heterocoagulation; John Herbst, longtime professor at the University of Utah and now in industry, who conducted pioneering work on modeling ball mill grinding, including incorporating energy instead of time into the population balance grinding model, the approach now universally used for scale-up. Four of my students have been elected to the National Academy of Engineering and two, who returned to India, to the Indian National Academy of Engineering. Two of my grandstudents are now in the National Academy of Engineering.

Several of my former students have commented on how their knowledge of the surface chemistry of solids has been extremely useful in their careers. The diversity of educational programs that I aimed at provided those students who elected an industrial career to go in many different directions. Some are working in industries concerned with mineral processing, but several in ceramics, soil cleaning, pharmaceuticals, agricultural chemicals, ink jet printing, fuel cells, CMP in the electronics industry.

At one time, in Europe there were several institutes devoted to particle science and technology. They seem to be disappearing. In the U.S., most of the academic research activities in mineral processing and in particle technology in the past were carried on by individual professors or groups of professors. The one particle center in the U.S. is the one established at Florida by Brij Moudgil, but his underlying NSF support has now concluded. The contraction of research support in this area should be one of concern.

However, today there is a nanotechnology center in practically every institution in the country, and worldwide research in nanomaterials is booming. Some of our own research involved nanoparticles in years past, but then the particles were called *colloids*. There certainly is a lot of hype about nanotechnology. Except for the tremendous advances in the semiconductor chip industry, which in any case were already there before the launch of the nanotechnology initiative, currently there are not many innovations in the market place based on nanotechnology. The projections about the potential market being as large as $1 trillion sounds really exaggerated.

From an engineering point of view, before this field can really be called a technology, much more needs to be done with respect to the reliability, reproducibility, standardization, productivity and engineering scale-up so that laboratory claims or successes can actually be scaled-up and realized in practice. Certainly major effort should be undertaken to understand the environmental, health and safety impacts of engineered nanoparticles. Producing nanotubes, nanorods, hollow nanoparticles, core and shell nanoparticles are certainly results of innovative chemistry and physics in the laboratory but to claim this as a technology is not correct. One sees excellent TEM/SEM photographs of these particles but to produce them reproducibly even at the kg scale currently is not an easy task. It is the involvement of process engineers and the applications of process engineering tools which will take this to the next stage.

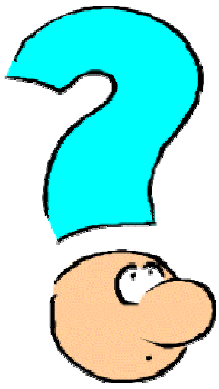
Pioneering work done by mineral processing engineers to understand the modeling and scale-up issues related to particle processing needs to be emulated by those working in the nano area. One problem is that not very many engineers are currently associated with this field, but chemical engineers appear to be realizing the opportunities this field offers.

Most of us are involved with the production of particles and the utilization of particles. However, handling waste particles is a major problem. A serious one is the very fine tailings from the Florida phosphate mines. At the Particulate Fluids Centre and its predecessor organization in the University of Melbourne, under the leadership of Tom Healy and Dave Boger, one of their research objectives has been developing methods for disposal and storage of tailings at high solids concentration. That provides a nice example of how one of my former students made a major advance by combining what he had learned in diverse areas of applied science and engineering of particulates – namely P.C. Kapur's recent model for predicting yield stresses of thick pastes. While working with Tom Healy at Melbourne, Kapur combined Professor Rumpf's elegant approach to the strength of agglomerates with DLVO particle interaction forces as a starting point. This model is now used in designing systems for handling red mud in alumina operations and dry tailings in other mining operations where water is scarce.

I would like to end with a little bit about particles and energy. One of the areas that I worked on for several years was a hybrid roll mill-ball mill process for improving the comminution of coal for power plants. Today, 700 million tons of coal are consumed annually in the U.S. for the generation of electricity, and all of this coal must first be pulverized – a massive production of particulates before combustion and resulting in fly ash particles afterwards. Our thirst for oil has led to mining the oil sands of Alberta, and within two years one district there expects to have expanded production to more than 1 million barrels of oil per day. Not including the soil stripped to get down to the oil sands, one ton of sand particles will have to be impounded for every barrel of oil produced. Some day the oil shale in the United States will be tackled in earnest since an estimated 1.5 trillion barrels of oil exist in the Colorado, Utah and Wyoming shales. Higher-grade shales will yield one barrel of oil per ton of rock – so you can imagine the magnitude of future problems that will encountered in handling tailings particles if that oil is ever recovered by mining in those arid states.

There is a multitude of opportunities for furthering our understanding of problems associated with conventional multi-phase particle technology, let alone the technology of processing ultrafine nanoparticles. Solving these will be the exciting role of engineers like my grandstudents and great-grandstudents.

"Know Floe's Korner"



Dry Screening – In A Nutshell

Shrikant Dhodapkar *(The Dow Chemical Company, USA)*
Lyn Bates *(Ajax Equipment, UK)*
George Klinzing *(University of Pittsburgh, PA)*

1. Screening process has been the workhorse for solid-solid separation in chemical, mineral processing, coal and agricultural sectors. They serve many purposes, for example scalping, separation of fines & coarse, dewatering, de-sliming and trash removal. The evolution of various concepts and designs is largely a result of application experience, ever expanding requirements of industry and the creativity of various manufacturers. Even today, most of the expertise on screening resides with the manufacturers.
2. There are two fundamental mechanisms underlying dry screening, namely
    a. Stratification of particle bed caused by the motion of the screener. Bed motion renews the layer of material exposed to the screen. It is also responsible for migrating smaller particles closer to the screen. Our classic understanding of segregation of particle mixtures is applicable here.
    b. Passage of particles through the screen aperture. This is a probability event dictated by competing processes that help and hinder the passage of particles.
3. The throughput (capacity), efficiency of separation and sharpness of cut depend on numerous factors. The complexity of interactions between them makes theoretical modeling of screening operation very challenging.

    Product Related: Particle size, shape, size and shape distribution, specific gravity, bulk density, moisture, coefficient of friction, internal angle of friction, cohesion, coefficient of restitution, abrasiveness, corrosiveness and electrostatic charging tendency.

    Hardware Related: Type of screen (wire cloth, perforated plate, bars, rods), weave or screen design, screen shape (flat or cylindrical), thickness of screen, motion of screen, dimension of screen, number of decks, size and shape of apertures, shape and size distribution of apertures (uniformity of mesh size), agitation blades and blinding prevention measures (e.g. brushes, scrapers, bouncing balls, rings, ultrasonic vibration, probability screens).

    Operation Related: Stroke, direction of stroke (as it relates to material flow), frequency, wave shape of vibration, angle of screener, depth of material on bed, velocity of material on the screener, residence time, wet or drying screening and method of feeding.

    It is evident that screener selection is a much more complex problem than simply specifying various cut sizes.

4. A survey of screening machines is shown in Figure 1. A wide range of concepts and mechanisms are championed by various manufacturers. For new applications, pilot scale testing is highly recommended.
5. Particles of all sizes (d_p) get an opportunity for passage through apertures (w) on a screen. The size fraction significantly smaller than aperture size (d_p<0.8w) readily passes through the screen whereas larger fraction (d_p>1.2w) is retained on the screen as the oversize. The fraction in-between the two limits can be considered "near mesh size." This fraction is responsible for screen blinding thereby reducing screener efficiency.
6. Screen blinding is caused by near-mesh particles that are stuck in the opening and can not be dislodged by normal motion of the screen surface. This results in reduction of capacity and loss of separation efficiency. A number of measures are available to address the screen blinding problem.
    a. Mechanical: Bouncing balls or hollow cylinders, brushes, scrapers, ultrasonic vibrations on screen and anti-static measures.
    b. Fluid Motive: Air jets and co-current flow.
    c. Probability screens: Prescreening the material with a slightly larger screen opening to remove near mesh size particles and reduce solids loading.

    Care should be taken in the handling of the screens and dislodging obstructions. Rough treatment of screens can affect their performance and cause errors in the amount of material retained and passing through the screen.
7. There are a number of screening media available, namely woven wire cloth, perforated plate, rods, bars and profile wire. A wide range of designs are available for each of these options. For instance, woven wire cloth can be obtained in plain weave, twilled weave, plain Dutch, herringbone twill, double-crimp, lock-crimp, intermediate crimp, etc. Similarly, perforated plates are available in square, round, hexagonal and rectangular openings with in-line or staggered configurations. Selection of screen type requires working within the constraints imposed by performance requirement (throughput and sharpness of cut), mechanical and operational reliability, cost (capital and operational) and material properties.
8. The designation of *Mesh Size* in a woven wire cloth without specifying the opening size or the wire gauge is meaningless. Mesh refers to number of openings per lineal inch. The actual size of the aperture and percentage open area depends on the diameter of the wire. It is also important to understand that the aperture size for a given analytical screen (U.S. Standard or Tyler) may differ from that of a square mesh screen cloth with same mesh designation. It depends on the wire diameter used for making the woven wire cloth.
9. The throughput (capacity) of dry mechanical screening operation drops off sharply when the interparticle forces (due to adhesion, cohesion, electrostatic charging) exceed inertial forces. Interparticle forces also prevent stratification of bed causing reduction in flow area due to coating on the screen. In such cases, a fluid motive force (pneumatic or hydraulic) is commonly used. This approach is commonly applied for scalping of fine powders (e.g. plastic powder, flour).

10. Industrial practice of screener selection, sizing, specification and operation is mostly empirical and experiential. Inadequate screener performance results in loss of prime product or poor product quality. New computational tools, such as DEM, have opened up new avenues for modeling and optimization [4]. It is a technology area that is ready for a **fresh** approach.

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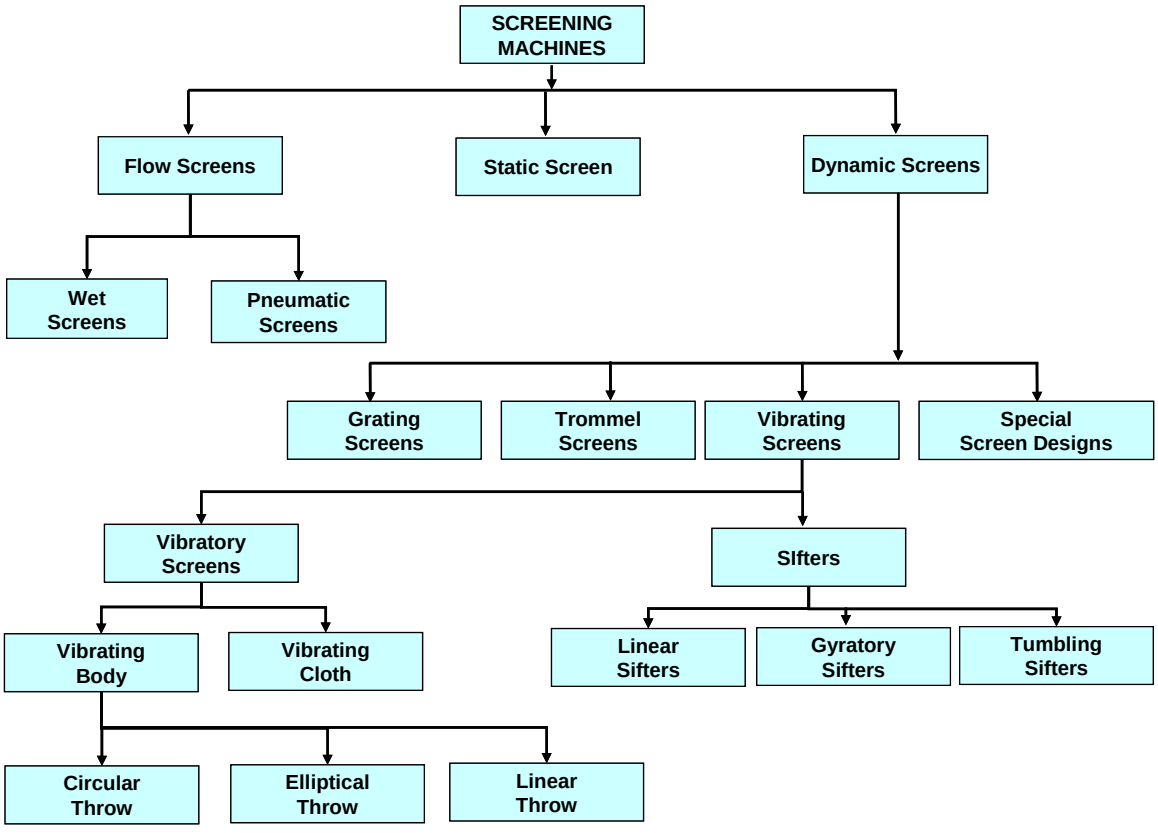

Figure 1. Classification of Screening Machines [1]

Upcoming Conference Calendar

2007

The 12th International Conference on Fluidization

May 13-17, 2007, Harrison Hot Springs – near Vancouver, B.C. (Canada)

Abstract Deadline: Passed

Website: http://www.engconfintl.org/7afbody.html

Statics and Dynamics of Granular Media and Colloidal Suspensions

July 4-6, 2007, Partenope Hall in the Congress Center of the Univ. di Napoli "Federico II", Via Partenope 36 - 80121 Napoli.

Abstract Deadline: December 23, 2006

Website: http://stphsatna07.na.infn.it/

Discrete Element Methods (DEM) 07

August 27-29, 2007, Brisbane, Australia

Abstract Deadline: Still Accepting

Website: http://www.min-eng.com/dem07/index.html

Annual AIChE Meeting

November 4-9, 2007, Salt Palace Convention Center, Salt Lake City, Utah

Abstract Deadline: May 14, 2007

Website: http://www.aiche.org/Conferences/AnnualMeeting/index.aspx

2008

Particulate Processes in the Pharmaceutical Industry II

January/February 2008, San Juan, Puerto Rico

Online request: www.engconfintl.org/8ap.html

Gordon Research Conference on Granular: Granular-Fluid Flow

June 22-27, 2008, Colby College, Maine

Applications due: June 1, 2008

Website: http://www.grc.org/programs.aspx?year=2008&program=granular

Annual AIChE Meeting

November 16-21, 2008, Philadelphia Marriott & Pennsylvania Convention Center, Philadelphia, PA

Website: http://www.aiche.org/Conferences/Calendar/2008.aspx

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Recognition: Professor Sotiris Pratsinis, pratsinis@ivuk.mavt.ethz.ch, 41-1-632-3180

Technical Programming Area Liaison and Group Chairs

The main focus of the PTF has been arranging for the extensive technical programs at the annual AIChE meeting in November. A lot of hard work goes into developing session themes, negotiating for sufficient time and reasonable scheduling of the sessions, attracting and screening papers, finding and training new session chairs, and making sure the whole process flows smoothly. Shrikant Dhodapkar, our Area 3 Liaison, attends an all-day session each January to plan the technical sessions at the Annual Congress and to arrange for co-sponsored sessions with other Divisions and Forums. Participation in this process is excellent training in and proof of management capabilities. The leaders selected this fall were

Position	Person	Affiliation
Area 3 Liaison	**Dr. Manuk Colakyan**	The Dow Chemical Co.
Area 3 Vice Liaison	**Dr. Shrikant Dhodapkar**	The Dow Chemical Co.
Group 3a – Particle Production and Characterization		
Chair	**Dr. Patrick Spicer**	Procter & Gamble Co. CETL
Vice-Chair	**Prof. M. Silvina Tomassone**	Rutgers University
Group 3b – Fluidization and Fluid-Particle Systems		
Chair	**Dr. Ray Cocco**	Dow Chemical Co.
Vice Chair	**Prof. Jesse Zhu**	Univ. of Western Ontario
Group 3c – Solids Flow, Handling, and Processing		
Chair	**Dr. James Davis**	Procter & Gamble Co.
Vice Chair	**Prof. Benjamin Glasser**	Rutgers University
Group 3d - Nanoparticles		
Chair	**Professor Yangchuan Xing**	University of Missouri-Rolla
Vice Chair		
Group 3e – Energetic Materials		
Chair	**Charles R. Painter**	Department of the Navy
Vice Chair	**Jerry S. Salan**	Naval Surface Warfare Center

Report from the Treasurer

Here is a report on the current balance and recent activity for both the AIChE administered PTF account as well as the PTF "petty cash" account (recently transferred to a Pittsburgh bank):

AIChE Account	**Starting**	**Income**	**Expenses**	**Balance**
As of 10/01/2006	$18,543.62			
Dues Income – Divisions (Oct.)		$ 495.00		
Registration Income – Special Events		$2,730.00		
PTF Dinner Awardees			$ 845.00	
Yank Sing Restaurant – Final Payment			$ 6,475.50	
Dues Income – Divisions (Nov.)		$ 480.00		
Registration Income – Special Events		$1,235.00		
Contributions – Corporate		$1,000.00		
Supplies – Special Purpose (Plaques)			$ 342.20	
Monetary Awards			$ 3,500.00	
Miscellaneous Expenses (Election)			$ 350.00	
Total as of 02/01/2007	$18,543.62	$5,940.00	$11,512.70	**$12,970.92**
Pitt Account	**Starting**	**Income**	**Expenses**	**Balance**
As of 01/25/2007	$ 1,432.68			
Additional Plaque (Area 3e)			$ 63.00	
Web Hosting			$ 119.70	
Total as of 02/01/2007	$ 1,432.68	$ 0.00	$ 182.70	**$ 1,249.98**

Joe McCarthy, PTF Treasurer

From the Editor's Desk

The *PTF Newsletter* is published twice a year as a vehicle for communication for all PTF members. PTF members are encouraged to send in news and information of general interest to PTF members. Please address your communication to

Professor Christine M. Hrenya
Department of Chemical and Biological Engineering
University of Colorado
Boulder, CO 80309-0424
Tel: (303) 492-7689; Fax: (303) 492-4341
email: hrenya@colorado.edu

If you would prefer to continue receiving a hard copy of the newsletter instead of the electronic version, please send a note to this effect to the editor at the above address.

Advertisements may also be placed in the newsletter. The rates on a per issue basis are:

1/4 page $40 1/2 page $60 Full page $110

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Help us get PTF news to your new address by filling in and e-mailing a change of address form. See the PTF web page at

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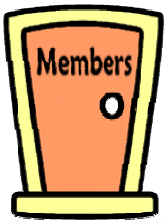

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MEMBERSHIP DUES (check only one line below) [Note that dues are for a calendar year]:
___ 15.00 $US for one year. Anyone use this option. For AIChE members dues will be listed on your AIChE dues invoice after your first year in PTF. Nonmembers don't receive a dues notice.
___ 75.00 $US for five years dues. ***Only*** nonmembers of AIChE are eligible for this option, which is provided as a courtesy so that non-members won't have to send in five small checks.

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