PTF Newsletter

Particle Technology Forum

AMERICAN INSTITUTE OF CHEMICAL ENGINEERS

Vol. 15 No. 1 Fall 2009

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

The Annual Meeting of the AIChE is also the Particle Technology Forum's most significant event when a large cross section of our membership is able to exchange technical information. This is also the opportunity to select the best presentations in each of our five areas and evaluate the poster offerings. At Nashville, we look forward to a great meeting with a total of 41 sessions. Here we count 10 sessions on Particle Production and Characterization, eight on Fluidization and Fluid Particle Systems, four on Solids Flow, Handling and Processing, six on Nanoparticles and four on Energetic Materials. We also have a poster and lecture award sessions.

This year we have been fortunate to add a 6 session Topical on Computational Particle Technology, one the fastest growing areas in our field. At this time I would like to thank the session chairs and co chairs for their dedication and hard work.

Finally, in addition to the scientific exchange this is our annual opportunity for recognition of the Forum award winners and for fun and camaraderie. So make sure that you join us for our dinner on Wednesday, November 11 at the Merchant's Restaurant in Nashville. The chair promises to keep the speeches short and wine flowing.

See you there!

Hugo S. Caram
Chair – Particle Technology Forum

2009 AIChE Annual Meeting

November 8-13, 2009
Gaylord Opryland Hotel
Nashville, TN
URL: http://www.aiche.org/Conferences/AnnualMeeting/index.aspx

Day of Week	Start Time	Session Title	Location
Monday	8:30 AM	Agglomeration and Granulation Processes (03A01)	Governor's Chamber D (Gaylord Opryland Hotel)
Monday	8:30 AM	Fundamentals of Fluidization I (03B00)	Governor's Chamber B (Gaylord Opryland Hotel)
Monday	8:30 AM	Solids Handling and Processing (03C02)	Governor's Chamber A (Gaylord Opryland Hotel)
Monday	12:30 PM	Characterization and Measurement in Powder Processing (03A07)	Governor's Chamber D (Gaylord Opryland Hotel)
Monday	12:30 PM	Mixing and Segregation of Particulates (03C02)	Governor's Chamber A (Gaylord Opryland Hotel)
Monday	3:15 PM	Circulating Fluidized Beds (03B02)	Governor's Chamber D (Gaylord Opryland Hotel)
Tuesday	8:30 AM	Application of Fluidization (03B02)	Delta Ballroom D (Gaylord Opryland Hotel)
Tuesday	8:30 AM	Characterization of Engineered Particles and Nano-Structured Particles (03A03)	Governor's Chamber A (Gaylord Opryland Hotel)
Tuesday	8:30 AM	Fluid-Particle Interactions and Processing (03C05)	Lincoln E (Gaylord Opryland Hotel)
Tuesday	12:30 PM	Fundamentals of Fluidization II (03B01	Delta Ballroom D (Gaylord Opryland Hotel)
Tuesday	12:30 PM	Synthesis, Characterization and Modelling of Nanoparticle Systems with Pharmaceutical Applica-tions (03C01)	Delta Ballroom C (Gaylord Opryland Hotel)
Tuesday	3:15 PM	Communution – Experiments, Theory & Modeling (03A06)	Jackson F (Gaylord Opryland Hotel)
Tuesday	3:15 PM	Dynamics and Modeling of Particles, Crystals and Agglomerate Formation (03A04)	Jackson E (Gaylord Opryland Hotel)
Tuesday	3:15 PM	Nanostructured Particles for Catalysis (03D07)	Delta Ballroom D (Gaylord Opryland Hotel)

Tuesday	6:00 PM	Poster Session: Particle Technology Forum (03000)	Ryman Hall B1/B2 (Gaylord Opryland Hotel)
Wednesday	8:30 AM	Functional Nanoparticles and Nanocoatings on Particles (03D08)	Governor's Chamber E (Gaylord Opryland Hotel)
Wednesday	12:30 PM	Functional Nanoparticles and Nanocoatings on Particles II (03D02)	Governor's Chamber E (Gaylord Opryland Hotel)
Wednesday	12:30 PM	Population Balance Modeling for Particle Formation Processes: Nucleation, Aggregation and Breakage Kernels (03A00)	Tennessee A (Gaylord Opryland Hotel)
Wednesday	3:15 PM	Applications of Engineered Structured Particulates (03A02)	Governor's Chamber B (Gaylord Opryland Hotel)
Wednesday	3:15 PM	Particle Technology Forum Awards Lectures (03001)	Delta Ballroom A (Gaylord Opryland Hotel)
Wednesday	3:15 PM	Magnetic Particle Synthesis and Properties (03A09)	Governor's Chamber E (Gaylord Opryland Hotel)
Thursday	8:30 AM	Gas/Solid Mixing and Heat/Mass Transfers in Fluidized Beds (03B04)	Jackson F (Gaylord Opryland Hotel)
Thursday	8:30 AM	Particle Formation in Supercritical Fluids for Food and Pharmaceuticals (03A05)	Magnolia Boardroom B (Gaylord Opryland Hotel)
Thursday	8:30 AM	Thermophysical Properties (03E03)	Lincoln C (Gaylord Opryland Hotel)
Thursday	12:30 PM	Gas Phase Synthesis of Nanoparticles (03D00)	Magnolia Boardroom B (Gaylord Opryland Hotel)
Thursday	12:30 PM	Fluidization and Fluid-Particle Systems for Gasification and Biomass Utilization (03B08)	Jackson F (Gaylord Opryland Hotel)
Thursday	12:30 PM	Processing and Safety (03E02)	Lincoln C (Gaylord Opryland Hotel)
Thursday	3:15 PM	Health and Environmental Effect of Nanoparticles (03D06)	Lincoln C (Gaylord Opryland Hotel)
Thursday	3:15 PM	Particle Formation and Crystallization Processes From Liquids, Slurries and Emulsions (03A08)	Magnolia Boardroom B (Gaylord Opryland Hotel)
Friday	8:30 AM	Environment and Lifecycle (03E01)	Governor's Chamber E (Gaylord Opryland Hotel)
Friday	8:30 AM	Fluidization and Handling of Submicron and Nano Particles (03E01)	Jackson E (Gaylord Opryland Hotel)
Friday	12:30 PM	Nano-Energetic Materials (03E00)	Governor's Chamber E (Gaylord Opryland Hotel)

2009 AIChE PTF Meetings in Philadelphia

Particle Technology Forum Executive Committee Meeting
Sunday, November 8, 2009
Time: 5:30 PM-7:30 PM
Location: Lincoln C (Level M), Gaylord Opryland Hotel

Particle Technology Forum - General Body Meeting
Monday, November 9, 2009
Time: 5:30-7:30 PM
Location: Belmont A (Level M) , Gaylord Opryland Hotel

PTF- Group 3 a (Particle Production & Characterization) – Programming Meeting
Monday, November 9, 2009
Time: 11:00 AM-12:30 PM
Location: Governor's Chamber D, Gaylord Opryland Hotel

PTF- Group 3 b (Fluidization & Fluid-Particle Systems) – Programming Meeting
Tuesday, November 10, 2009
Time: 11:00 AM-12:30 PM
Location: Delta Ballroom D, Gaylord Opryland Hotel

PTF - Group 3 c (Solids Flow, Handling, and Processing) – Programming Meeting
Tuesday, November 10, 2009
Time: 11:00 AM-12:30 PM
Location: Lincoln E, Gaylord Opryland Hotel

PTF - Group 3 d (Nanoparticles) – Programming Meeting
Wednesday, November 11, 2009
Time: 11:00 AM-12:30 PM
Location: Governor's Chamber E, Gaylord Opryland Hotel

PTF - Group 3 e (Energetic Materials) – Programming Meeting
Thursday, November 12, 2009
Time: 11:00 AM-12:30 PM
Location: Lincoln C, Gaylord Opryland Hotel

PTF Awards

Fluidization Process Recognition Award

Sponsored by The Dow Chemical Company

Dr. Syamlal Madhava

Contact Details:
National Energy Technology Lab

Dr. Syamlal has had a remarkable influence on the progress in the analysis of fluid-particle flow systems, both through direct contributions to model development, simulation and validation and via indirect impact resulting from the development of the open-source MFIX code. He has champion the integration of experimental/ computational programs to not only improve the computational models but also to understand the complex behavior of reacting gas solids flows.

PSRI Lectureship Award

Sponsored by Particulate Solid Research, Inc.

Professor Martin Rhodes

Contact Details:
Monash University, Australia

Martin Rhodes holds a bachelors degree in chemical engineering and a PhD in particle technology from the Bradford University in England, industrial experience in chemical and combustion engineering and many years experience as an academic at Bradford and Monash University. He has research interests in various aspects of gas fluidization and particle technology, areas in which he many refereed publications in journals and international conference proceedings. Martin has a keen interest in particle technology education and has published a textbook, Introduction to Particle Technology (now in its 2nd edition) and CDROM on Laboratory Demonstrations and directed continuing education courses for industry in the UK and Australia. Martin has a Personal Chair in the Department of Chemical Engineering at Monash University, Australia, where he was Head of Department until his retirement in 2008.

Particle Technology Award

Sponsored by E.I. DuPont de Nemours and Company

Dr. Ted Knowlton

Contact Details:

Particulate Solid Research, Inc. (PSRI)
Chicago, IL

Dr. Knowlton continues to actively pursue a better understanding of fluid-particle systems and its application in fluidized beds, risers, solids transport, non-mechanical valves, gasification, standpipes, cyclones, etc. He continues to educate many professional engineers in the field. Dr. Knowlton is President of Particulate Solid Research, Inc. ({PSRI) in Chicago, Illinois.

Thomas Baron Award in Fluid-Particle Systems

Sponsored by Shell Global Solutions

Professor Alan Weimer

Contact Details:

Department of Chemical and Biological Engineering
University of Colorado

Professor Weimer is a Sears Professor and C2B2 Executive Director at University of Colorado at Boulder. He is actively engaged in reactor engineering, advanced ceramic materials, fluidization, environmental resource recovery where he strives for a fundamental understanding and innovation of fluid-particle processing for advanced materials synthesis and functionalization of ultrafine powders resulting in high valued products and new businesses.

Best Ph.D Thesis Award

Sponsored by Procter & Gamble

Dr. Luis F. Hakim

Ph.D.: The University of Colorado at Boulder

Dr. Hakim's dissertation developed an understanding of reduced pressure fluidization of nanoparticles and their functionalization by atomic layer deposition (ALD). He is currently a Global Product Manager at Applied Materials in Santa Clara, California.

PTF Award Lectures

Wednesday, November 11, 2009
3:15 PM
Delta Ballroom A (Gaylord Opryland Hotel)

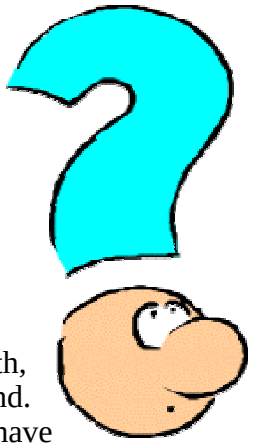
"Functionalization of Fine Particles by Atomic/Molecular Layer Deposition (ALD/MLD)"
Professor Alan Weimer, Department of Chemical & Biological Engineering, University of Colorado
Recipient of Thomas Baron Award

"Every Grain of Sand"
Professor Martin Rhodes, Monash University
Recipient of PSRI Lectureship Award

PTF Banquet Dinner

This year's PTF dinner will be at The Merchants Restaurant in historic downtown Nashville. The reception will start at 6:00 pm with dinner at 7:00 pm. Bus transportation will be provided leaving from the Gaylord Opryland Resort and Convention Center starting at 5:45 pm with return trips starting at 9:30 pm.

"Know Floe's Korner"



Are Some Pneumatic Conveying Problems Wicked?

George E. Klinzing, University of Pittsburgh

Wicked problems are some of the most challenging in the world. World health, global warming, and the energy challenge are some that quickly come to mind. Wicked problems are problems that do not have right and wrong solutions but have rather degrees of good and bad. These problems can be tamed but never totally conquered. Some may say that dilute pneumatic phase conveying is totally solved but some would indicate that there is a sub-set that is still a big challenge. Dense phase conveying issues are more wicked than dilute phase conveying. One can probably take a closer look at such parameters as size, distribution, shape, abrasiveness, hardness, environmental condition, densities, tackiness, and others and define what properties or conditions cause the conveying problem to turn wicked. Industry is always developing new materials and processes which often lessen our confidence in being able to design conveying systems without problems. More stringent conditions are placed on the system whether it is the change in the character of the material to the size of the system, large or minute.

Camillus has provided a format for analysis of wicked problems in his recent article in the Harvard Business Review. As stated here clearly, wicked problems can't be solved, but they can be tamed. Wicked issues are different because traditional processes can't resolve them, according to Rittel and Webber (1973).

Some Examples of Wicked Problems In Pneumatic Conveying?

There are several ways to define a wicked problem, but according to Rittel and Webber it has some or all of 10 characteristics. It probably is advisable to see how the 10 questions are posed of wicked problems stack up for the field of pneumatic conveying.

1. There is no definitive formulation of a wicked problem and it is not possible to write a well-defined statement of the problem. At first glance this may not seem applicable to pneumatic conveying. What needs to be explored further is what does "well defined mean
2. Wicked problems have no stopping rule. This means that you can tell when you've reached a solution with an ordinary problem. With a wicked problem, the search for solutions never stops. Again one would say that this is generally not the case for pneumatic conveying design but there are always exceptions to the rules.
3. Solutions to wicked problems are not true or false, but good or bad. We have these problems often in pneumatic conveying.
4. There is no immediate and no ultimate test of a solution to a wicked problem**.** Wicked problems generate unexpected consequences over time, making it difficult to measure their effectiveness.

5. Every solution to a wicked problem is a "one-shot" operation; because there is no opportunity to learn by trial and error. This criterion is questionable for pneumatic conveying because I do believe that we can learn from trial and error. I think that we can characterize these criteria as sometime no and sometimes yes.

6. Wicked problems do not have an exhaustively describable set of potential solutions, or permissible operations that may be incorporated into the plan. Ordinary problems come with a limited set of potential solutions, by contrast. From our experience in pneumatic conveying there tend to be multiple solutions and plans can be developed for improvement although they may be elusive in some cases.

7. Every wicked problem is essentially unique. An ordinary problem belongs to a class of similar problems that are all solved in the same way. A wicked problem is substantially without precedent; experience does not help you address it. Again pneumatic conveying does not point in this direction all the time.

8. Every wicked problem can be considered to be a symptom of another problem**.**

9. The existence of a discrepancy representing a wicked problem can be explained in numerous ways. A wicked problem involves many stakeholders, who all will have different ideas about what the problem really is and what its causes are. In the statement that different stakeholders have different perceptions one can see this in our expert system on troubleshooting (PANACEA).

10. The planner has no right to be wrong. Problem solvers dealing with a wicked issue are held liable for the consequences of any actions they take, because those actions will have such a large impact and are hard to justify. The statement that planners do not have the right to be wrong aligns with consultants who are often wrong.

Strategy for Managing Wicked Problems

This is a list of possible actions to address wicked problems:

- Involve stakeholders, document opinions, communicate.
- Use social planning process.
- Organize brainstorming sessions to identify all aspects.
- Create a shared understanding and a commitment to solve.
- Many stakeholders make the process complex but opens the door for creativity.
- Food functions are useful.
- Explore and monitor assumptions.
- Use feed forward approaches.
- Envision the future by constantly exploring and monitoring.
- Incorporate efficiencies.

References

Camillus, J.C. 2008. Strategy as a wicked problem. Harvard Business Review. 86(5): 98-106.

Rittel, H.W.J., and M.M. Webber. 1973. Dilemmas in a general theory of planning. Policy Sciences. 4(2):155-158.

Dhodapkar, S.V. and G.E. Klinzing, PANACEA – Expert System for Troubleshooting Pneumatic Conveying Systems, Copyright - University of Pittsburgh, 1989.

Upcoming Conference Calendar

2009

2009 Annual AIChE Meeting
November 8-13,2009, Gaylord Opryland Hotel, Nashville, TN

Abstract deadline: Passed

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

Southern Workshop on Granular Matter 2009
November 30–December 4, 2009, Viña del Mar, Chile

Abstract deadline: Passed

Website: http://www.dfi.uchile.cl/~granular09/

Seventh International Conference on Computational Fluid Dynamics in the Minerals and Process Industries
December 9-11, 2009, Melbourne, Australia

Abstract deadline: passed

Website: http://www.cfd.com.au/cfdconf/

2010

Sixth World Congress in Particle Technology
April 26-29, 2010, Nuremberg, Germany

Website: http://www.wcpt6.org/en/default.ashx

Abstract deadline: Passed

FLUIDIZATION XIII: New Paradigm in Fluidization Engineering
May 16-19, 2010, Korea

Website: http://www.engconfintl.org/10af.html

Abstract deadline: Passed

International Conference on Multiphase Flow
May 30 - June 4, 2010, Tampa, FL

Abstract Deadline: September 15, 2009

Website: http://conferences.dce.ufl.edu/ICMF2010/

2010 AIChE Annual Meeting
October 17-22, 2010, Salt Lake City, Utah

2011

2011 AIChE Annual Meeting
October 16-21, 2011, Minneapolis, MN

Officer and Committee Listing

Officers:

Chair 2008-2012: Professor Hugo S. Caram, hsc0@lehigh.edu, 610-758-4259
Vice-Chair 2008-1012: Dr. Ray Cocco, ray.cocco@PSRIChicago.com, 773-523-7227
Immediate Past Chair 2006-2008: Dr. Shrikant Dhodapkar, sdhodapkar@dow.com, 979-238-7940
Secretary 2006-2008: Dr. Stephen Conway, Stephen-conway@merck.com, 215-652-6031
Treasurer 2006-2008: Professor Jennifer Sinclair Curtis, jcurtis@che.ufl.edu, 352-392-0882

Liaisons:

Academic 2008-2012: Professor Hamid Arastapoor, arastoopour@iit.edu, 312-567-3038
Academic 2008-2012: Professor Alissa Park, ap2622@columbia.edu, 212-854-8989
Academic 2006-2010: Professor Jennifer Sinclair Curtis, jcurtis@che.ufl.edu, 352-392-0882
Academic 2006-2010: Professor Joseph McCarthy, mccarthy@engr.pitt.edu, 412-624-7362
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Industry 2008-2012: Dr. Stephen Conway, Stephen-conway@merck.com, 215-652-6031
Industry 2006-2010: Dr. Ecevit Bilgili, ecevit_bilgili@merck.com, 215-652-2821
Industry 2006-2010: George Fotou, george_fotou@cabot-corp.com, 505-563-4275
AIChE-CTOC: Professor Esin Gulari, egulari@chem1.eng.wayne.edu, 313-577-5767
AIChE Staff Associate: Ms. Nina Scatton, ninas@aiche.org, 203-702-7660

Standing Committees (Chairs):

Awards Committee 2006-2008: Professor Hugo S. Caram, hsc0@lehigh.edu, 610-758-4259
Education: Dr. Ralph D. Nelson, erptmged@aol.com, 302-239-0409
Membership: Mark Bumiller/Hugo Caram, mark.bumiller@malvernusa.com, 508-480-0200, ext. 222/hsc0@lehigh.edu.edu, 610-758-4259
Newsletter Editor: Professor Christine Hrenya, hrenya@colorado.edu, 303-492-7689
Nominations: Professor Alan Weimer, weimera@colorado.edu, 303-492-3759
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	**Prof. M. Silvina Tomassone**	Rutgers University
Vice-Chair	**Dr. Ecevit Bilgili**	Merck and Company, Inc.
Group 3b – Fluidization and Fluid-Particle Systems		
Chair	**Dr. Jesse Zhu**	Univ. of Western Ontario
Vice Chair	**Reza Mostofi**	UOP LLC
Group 3c – Solids Flow, Handling, and Processing		
Chair	**Prof. Benjamin Glasser**	Rutgers University
Vice Chair	**Dr. Bruce Hook**	Dow Chemical
Group 3d - Nanoparticles		
Chair	**Professor Yangchuan Xing**	University of Missouri-Rolla
Vice Chair	**Gary Liu**	DuPont
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 my final treasurer's report including the state of the accounts from the end of the 2008 meeting through September of 2009.

AIChE Account	Starting	Income	Expenses	Balance	COMBINED
As of 11/01/2008	$29,035.14				
Investment Income (Dec)		$0.00			
Investment Income				$0.00	
Dues Income – Divisions (Nov)		$330.00			
Dues Income – Divisions (Dec)		$810.00			
Dues Income – Divisions (Jan)		$330.00			
Dues Income – Divisions (Feb)		$210.00			
Dues Income – Divisions (Mar)		$210.00			
Dues Income – Divisions (Apr)		$120.00			
Dues Income – Divisions (May)		$75.00			
Dues Income – Divisions (Jun)		$15.00			
Dues Income – Divisions (Jul)		$15.00			
Dues Income – Divisions (Aug)		$630.00			
Total Dues				$2,745.00	
Registration Income - Special Events (08-11)		$2,040.00			
Registration Income Correction - Special Events (08-12)		($85.00)			
Registration Income - Special Events (09-07)		$170.00			
Registration Income - Special Events (09-08)		$255.00			
Registration Income – YTD				$2,380.00	
Supplies - Special Purpose (Plaques: 08-11)			$88.12		
Supplies - Special Purpose (Plaques: 08-12)			$97.63		
DInner Cost (08-11)			$8,775.10		
Award Cost (08-11)			$3,500.00		
AV Equipment rentals (08-12)			$1,080.81		
Totals as of 10/01/2009	$29,035.14	$5,125.00	$13,541.66	**$20,618.48**	**$24,874.50**

Pitt Account	Starting	Income	Expenses	Balance	
As of 11/01/2008	$1,183.72				
J and J Best Paper sponsorship + Dinner fees		$520.00			
PSRI donation (08-12)		$1,275.00			
Wire transfer fee			$13.00		
Jenike and cpfd 2008 dinner donations		$1,897.70			
Hugo C. (reimburse : 2008 dinner)			$500.00		
Web hosting for 04/2009-04-2010			$107.40		
Totals as of 10/01/2009	$1,183.72	$3,692.70	$620.40	**$4,256.02**	

Joe McCarthy, outgoing 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
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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.

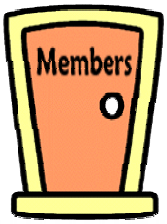
Advertisements may also be placed in the newsletter. The rates on a per issue basis are:

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

Moving? New E-mail?

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

http://www.erpt.org/ptf/addrchng.txt



Membership Information

Membership Application for the Particle Technology Forum, AIChE

CONTACT INFORMATION (print or type):

Name: _____ Title: _____

Category (check only one): AIChE Member ___ [# if you are a member = _____]

Not an AIChE member _____

Company or University: _____

Address: _____

City: _____ State: _____ ZIP: _____ Country: _____

Work Phone: _____ FAX: _____

Email: _____

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.

METHOD OF PAYMENT (check and fill-in only one line below):

___ check (must be in $US on a U.S. bank or on a foreign bank with a New York City branch.)
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