

The PTF Newsletter





Hope that you all had a wonderful summer, and I am now looking forward to seeing you all at the AIChE Annual meeting in Pittsburgh. Just as a reminder, if you have not done already, please purchase your PTF Dinner tickets as soon as possible, since the event has been sold out previous few years. The <u>PTF Dinner</u> this year will be at the <u>Grand Concourse</u> restaurant, a former train station turned upscale restaurant. It is an easy taxi ride or a nice walk from the convention area and the dinner will start at 6:30pm.

Please join us for the dinner and give a round of applause to our winners of awards ranging from PTF Lifetime Achievement to Best Ph.D. You can find these details in this issue including the names and bios of the award winners. During the dinner, we will also honor the poster award and other student travelship winners. The latter is a new award that I am very excited about, and I will provide further information on that at the PTF General meeting in Pittsburgh. The PTF dinner and reception are supported in part by generous support from our kind supporters, Jenike & Johanson, USA, and Freeman Technology, UK.

You are all invited to the <u>PTF General Business Meeting</u> on held Monday, October 29, 2018, 6:00pm - 7:00pm, Convention Center - 413. In addition, all past PTF Chairs and current PTF EC members are also invited to attend the PTF Executive Committee (EC) meeting, Sunday, October 28, 2018, 8:00pm - 9:30pm, Westin Convention Center -Somerset East. Please let me know if you plan to attend the EC meeting or if you have questions. Please also attend the <u>PTF Programming Meetings</u> of Groups 3a through 3e. We will continue with a revised format that was used last year so there will be two joint sessions. Areas 3a, 3d, and 3e Joint Meeting will be Tuesday, 10:30am – 11:50am in room 413 and Areas 3b and 3c Joint Meeting in room 415, both in the Convention Center. Please reach out to area chairs and co-chairs ahead of time if you want to volunteer for 2019 program, and please also attend these meetings so your input can be gathered.

Lastly, please join us for the <u>PTF Awards Lectures (529)</u> that will include three major award lectures. It is scheduled for 12:30pm - 3:00pm, Wednesday, October 31, 2018, Convention Center - 415. Enjoy presentations from these outstanding people in our field, and congratulate them.

Safe travels see you in Pittsburgh.

Rajesh N. Dave, NJIT Chair, Particle Technology Forum

AIChE Annual Meeting—Pittsburgh

October 28, November 2, 2018



Technical Program	Featured Events
Particle Techno	logy Forum
Technical Programming	Awards Lectures
Programming Meetings	PTF Dinner

At the Annual Meeting, we once again come together not just to share our research, but also to acknowledge and celebrate the achievements of our peers. This year is no different - as reflected in this Newsletter.

I have had the privilege of serving as the editor of PTF newsletter for the past four years, and I will be passing on the baton next year. If you are interested in serving as the editor, please contact <u>me</u> or the PTF Chair / Co-Chair. Safe travels to Pittsburgh!

Shrikant Dhodapkar, Dow Chemical Editor, PTF Newsletter



2018 Particle Technology Forum Awards

PTF Lifetime Achievement Award



Sotiris Pratsinis ETH Zurich

Sotiris Pratsinis is Professor of Process Engineering and Materials Science at ETH Zurich, Switzerland. His research centers on particle dynamics for synthesis of novel functional materials. He teaches Mass Transfer & Micro-Nano-Particle Technology, has graduated 40 PhD students (at leading industrial and academic institutions worldwide today), published 400+ refereed articles, received 20+ patents that are licensed to industry and have contributed to creation of four spinoffs.

He pioneered the creation of robust algorithms for agglomerate dynamics (two-dimensional population balances) that are interfaced readily with fluid mechanics, facilitating multiscale process design for manufacture of particulate commodities and lightguide preforms. He has shown experimentally how to closely control particle size, crystallinity and morphology, from perfectly spherical to fractal-like structures. He resolved the toxicity origin (ions or particles) of nanosilver (one of the most widely used nanomaterials) that had challenged early on its broad application. He developed the flame spray pyrolysis process for scalable synthesis of films and particles creating new (e.g. single atom) catalysts, gas sensors for breath analysis, nutritional supplements and dental materials. He is member of the Swiss Academy of Engineering and an AIChE Fellow.



Ah-Hyung Alissa Park Columbia University

A.-H. Alissa Park is the Lenfest Chair in Applied Climate Science of Earth and Environmental Engineering & Chemical Engineering at Columbia University. She is also the Director of the Lenfest Center for Sustainable Energy at the Earth Institute.

Her research focuses on sustainable energy conversion pathways with emphasis on particle technology and integrated reaction schemes of carbon capture, utilization and storage (CCUS). The current efforts include the fundamental studies of chemical and physical interactions of natural and engineered materials with CO₂ such as the development of novel nano-scale hybrid materials for integrated CO₂ capture and conversion.

Alissa has rapidly become one of the most respected faculty members in the area of carbon capture, utilization and storage (CCUS). Her research in sustainable energy is unique because it is based on the fundamentals of particle technology and fluid-particle systems. Alissa couples the reaction kinetics of highly complex heterogeneous solid systems with transport behaviors of fluid-particle systems in both nature and engineered processes. Her contribution in the field has greatly advanced our understanding of fluid -particle reactive flow systems and introduced particle technology fundamentals to other research areas. Park has received numerous professional awards in recognition of her research.

2018 Particle Technology Forum Awards

Shell Thomas Baron Award in Fluid-Particle Systems



Chi-Hwa Wang National University of Singapore

Chi-Hwa Wang's research has focused on fundamental understanding of instabilities in fluid-particle flows and translational applications of particulate systems in biomedical, pharmaceutical, energy and environmental fields. His research projects have elucidated the linear and nonlinear dynamic behaviors of granular flows under shear, gravity-driven flow and vibration through a combination of simulations and experiments. He has studied the dynamics of particle flows in pneumatic conveying through electrical capacitance tomography and computational fluid dynamic (CFD) and discrete element method (DEM) simulations to characterize the dynamic patterns in fluid-particle flows, particle attrition and triboelectrification. His influential translational research includes the use of CFD analysis to predict transport and reactions of drug molecules in biomedical (e.g. brain tumors, liver and bones) and pharmaceutical manufacturing systems. Chi-Hwa Wang's publications are largely related to fluid-particle systems, particle technology, and translational particle technology research for pharmaceutical, biomedical, and renewable energy applications. He currently serves as an Executive Editor for Chemical Engineering Science (2013-present) and is on several editorial boards: Powder Tech (2008present), Adv. Powder Tech. (2009- present), J. Controlled Release (2009-present), and Applied Energy (2017–present). Dr. Chi-Hwa Wang is currently a Professor of Chemical and Biomolecular Engineering at the National University of Singapore (NUS).

ANSYS PTF Service Award



Shrikant Dhodapkar Dow Chemical Company

Shrikant Dhodapkar is a Fellow in Performance Plastics Process R&D at Dow and a Fellow of AIChE.

Shrikant has served the Particle Technology Forum organization in various capacities over the past 25 years. He is the past Chair and Programming Coordinator of PTF. He was instrumental in the formation of Group 3c, and served as its chair. He was the technical program chair for the 5th World Congress on Particle Technology. He has also served on AIChE's Chemical Technology Operating Council. He has been the PTF Newsletter editor for the past four years.

Shrikant has extensive industrial experience in designing & troubleshooting solids processing plants, with special expertise in pneumatic conveying, silo storage, separations, fluidization, drying, particle and powder characterization, mixing/blending, dosing, and coating technologies. At Dow, his expertise has been critical in designing, starting-up and successfully operating world scale elastomers plants. He is the co-author of six chapters in various handbooks, and has published over 40 articles on various aspects of solids processing. He is also the recipient of more than 15 Dow Technology Awards. Shrikant is a recipient of Dow's prestigious *Excellence in Science Award* recognizing his sustained accomplishments in field of bulk solids handling.

Shrikant has been a powerful spokesperson for the importance and advancement of particle technology in plant and process designs.

2018 Particle Technology Forum Awards

SABIC Young Professional Award



Yi Fan Dow Chemical Company

Yi Fan is currently an Associate Research Scientist at the Solids Processing Group in the Corporate R&D of The Dow Chemical Company. Prior to this, he was a Post doctoral Fellow in the Department of Mechanical Engineering at Northwestern University from 2011 to 2013. He received his Bachelor (2003) and Master (2006) degrees in Thermal and Power Engineering from Tsinghua University of China and received his PhD (2011) in Civil engineering from the University of Minnesota -Twin Cities. His research interest focuses on understanding the fundamentals of particulate flows and particle technology including solids mixing and segregation, bin and hopper flows, drying, size reduction and granulation, and also utilizing this knowledge to address challenges in the chemical industry. At Dow, he has led efforts in a number of solids processing related R&D projects and made substantial impact on the new process and product development. Yi has produced a body of work related to dense flowing granular materials, his most significant and impactful contribution is that of developing an approach for modeling particle size segregation.

He has published more than 20 peer-reviewed journal articles and presented over 40 presentations in scientific conferences. He is a senior member of AIChE, the publicity chair of the local section of Mid-Michigan AIChE, and served as session chairs for the AIChE Annual Meetings.

George Klinzing Best PhD Award



Feng He University of North Carolina

Feng He s a senior chemical modeling engineer at Tesla. He is responsible for chemical system modeling and design of Tesla Gigafactory. Feng obtained his Ph.D. in chemical engineering in 2015 from NCSU, with dissertation entitled "Novel redox processes for carbonaceous fuel conversion". His PhD dissertation focused on the development of redox catalyst particles for a number of novel, redox-based energy conversion schemes. More specifically, he contributed significantly to a hybrid solarredox process for methane and solar energy conversion, a chemical looping gasification scheme to convert coal into hydrogen, and a chemical looping combustion (CLC) process for methane combustion with in-situ CO₂ capture.

Feng successfully designed a redox catalyst particle composed of a ferrite based oxygen carrier promoted with a mixed ionicelectronic conductor support. Compared to typical redox particles for solar-thermal water-splitting, the new redox catalyst reported is an order-of-magnitude more effective. He further proposed a layered reverse-flow reactor concept to maximize the thermodynamic driving force for watersplitting. Using his new concept, over 77% steam to hydrogen conversion was achieved at 930 °C, which more than triples the best performance reported previously. Feng was also the first to investigate fine particle generation from fluidized bed based chemical looping combustion (CLC) processes. Attrition in CLC can lead to loss of bed materials and emission of harmful particulate matters (PM).

PTF Committee & Programming Meetings AIChE Annual Meeting (Pittsburgh)

Meeting	Date/Time	Location
Particle Technology Forum (PTF) Executive Committee Meeting (by invitation)	Sunday, October 28, 2018 8:00pm - 9:30pm	Westin Convention Center Somerset East
PTF General Business Meeting— open to all members	Monday, October 29, 2018 6:00pm - 7:00pm	Convention Center - 413
Programming Meeting Groups 3a and 3d	Tuesday, October 30, 2018 10:30am - 11:50am	Convention Center - 413
Programming Meeting Groups 3b and 3c	Tuesday, October 30, 2018 10:30am - 11:50am	Convention Center - 415
Programming Meeting—Group 3e	With Group 3a/3d or arrange at their convenience	



The Dow Chemical Co. Sponsor of the Particle Processing Award



Sponsor of the Young Professional Award



University of Pittsburgh Alumni Sponsor of the George Klinzing Best PhD Award

PTF Membership

To continue receiving the PTF newsletters (3 issues per year) and stay current with particle technology events and news, please make sure to renew/start your membership by either:

- Checking Particle Technology Forum when renewing your AIChE membership annually.
- Become a PTF lifetime member so that you don't have to renew membership every year.

Become a PTF only member

(annual \$15, lifetime \$150)

If you don't see the PTF membership in your renewal screen, you can choose "Update Membership Options" and add PTF to your order.

You can also contact AIChE customer service at 800-242-4363 (US); +203-702-7660 (Outside the US); or email customerservice@aiche.org for membership questions and help.

PTF Membership Committee

Educational Efforts - Annual Meeting

The World of Particle Technology Shared with Future Engineers and Scientists AIChE Particle Technology Forum Student Workshop

Ben Freireich (PSRI), S.B. Reddy Karri (PSRI), Mayank Kashyap (SABIC) – Chair

As part of the mission of AIChE PTF, we have been proudly serving the particle technology community by introducing the field to students, young engineers and scientists, and raising awareness about its importance and relevance to the modern Chemical Process Industry. Continuing the tradition of organizing workshops for students at the *AIChE Annual Student Conferences* over the years, PTF will be bringing the world of particle technology into the lives of future engineers and scientists once again this year in Pittsburgh, PA.

The hugely successful workshops provided by PTF in the past few years had witnessed over 500 students and professors in attendance on each occasion. We expect to raise the bar even higher this year with a greater response from participants. We encourage undergraduate and graduate students to participate in the following fun-filled and educational session that will include exciting presentations and live demonstrations from some of the well-renowned researchers in the field of particle technology:

World of Particle Technology – Fluidization and Solids Handling 2018 AIChE Annual Student Conference Saturday, October 27, 2018: 3:45 PM – 4:30 PM David L. Lawrence Convention Center, 304/305

2017 AIChE PTF Student Workshop



Photographer: Teresita Kashyap (Dow)

More than 80% of your gasoline, 70% of your polyolefins and a plethora of other products are made using fluidized bed technology. From gasification to drying, fluidized beds and circulating fluidized beds provide the distinct advantage of high heat transfer and solids mobility. These features have resulted in several breakthrough technologies with better temperature control and the ability to move solids from a reduction to an oxidation environment. This workshop will focus on some of these breakthrough technologies.

Billions of pounds of bulk solids are processed and handled every year by the US process industries, yet most chemical engineers are ill-equipped to deal with the complexities of the engineering science of solids processing/particle technology. Hence, plants and products suffer with lost production, inability to achieve design production rates, off grade or off specification products, etc. During this session, we will take a look at the fun and exciting (and often counterintuitive!) world of solids processing. Specifically, we will look at some of the more common particle-based technologies examining both the important role they play in society today along with the associated technical challenges.

Demonstration of Particle Technology in Action: If a picture is worth a thousand words, then a video is worth a thousand pictures and a live demonstration is worth a thousand videos. This session will also illustrate some of the awe-inspiring and unique features in the field of particle technology through hands-on demonstrations on fluidization, hopper design, segregation, etc.

Details on the workshop can be found <u>here</u> or email **Mayank Kashyap** (<u>mkashyap@sabic.com</u>) for additional information.

Nuggets in Particle Technology

Session 44: Educational Efforts in Particle Technology

Sunday, October 28th – 3:30pm - 6:00pm (DL Convention Center 415)

This year, the PTF education session will focus on bringing practical "nuggets" of particle technology to the session attendees. We have assembled a broad cross section of both industrial practitioners and academics to present their thoughts on a variety of practical particle topics, which should be useful to all. Each speaker will give a 20 minute overview of their topic followed by 5 minutes of Q&A. Please join us for an exciting session.

Ben Freireich – *PSRI* – Ben will demonstrate the concept of the Janssen equation and will show how it impacts a broad range of particle technology, not just silo design.

Carl Wassgren – *Purdue University* – Much of particle technology doesn't follow the gas/liquid paradigm. Carl will focus on several aspects of particulate materials that are unexpected or under-appreciated by those not familiar with the field.

George Klinzing – University of Pittsburgh – Pneumatic conveying is a widely used technology for the transfer of bulk solids. George will present some useful tips for the improvement of conveying system performance.

Madhusudhan Kodam – *Corteva/DowDupont* – Particles are coated for many different reasons such as flow improvements, anti-blocking, and controlled release. Madhu will highlight the basic calculations as well as give practical examples of coating problems.

Willie Hendrickson – *AVEKA* - Microencapsulation of particles allows us to tailor make particles for improved product performance. Willie will present an overview of the technology including both the fundamentals and practical applications.

Karl Jacob – *University of Michigan* – Air (or more generally gas) can be used to great advantage in particle technology systems, however, not always! Karl will explore situations where air (through fluidization, maldistribution, etc.) can significantly impact solids processing technologies along with some practical remedies for these problems.

Special Sessions - Annual Meeting 2018

- SABIC Award Winner—Invited Talk: <u>Session 87 Fundamental of Fluidization</u> Monday, October 29, 2018 / 08:00 AM - 10:30 AM / / David L. Lawrence Convention Center 415
- Session 364: Celebrating Career Accomplishments of Prof. Yutaka Tsuji

Tuesday, October 30, 2018 / 12:30 PM - 03:00 PM / David L. Lawrence Convention Center 415

• Session 529: Particle Technology Awards Lectures

Wednesday, October 31, 2018 / 12:30 PM - 03:00 PM / David L. Lawrence Convention Center 415

- ⇒ Particle Technology: From Fundamentals to Translational Pharmaceutical and Energy Applications, Chi-Hwa Wang, National University of Singapore, Singapore, Singapore
- ⇒ Aerosol Particle Technology: from Carbon Black to Breath Sensors, Sotiris E. Pratsinis, Particle Technology Laboratory, Institute of Process Engineering, ETH Zurich, Zurich, Switzerland
- ⇒ Towards Sustainable Energy and Materials: Carbon Capture and Conversion using Novel Liquid-like Nanoscale Hybrid Particulate Systems, Ah-Hyung Alissa Park, Columbia University, New York, NY
- Session 375: Particle Technology Forum Poster Session

Tuesday, October 30, 2018 / 03:30 PM - 05:00 PM / David L. Lawrence Convention Center - Exhibit Hall B

PTF Travel Awards

Through generous support from **CPFD Software LLC**, Particle Technology Forum has awarded four student-member travel grants to support their attendance to the 2018 AIChE Annual Meeting. The recipients of the travel grants in 2018 are ...

- Guanhe Rim (Columbia University)
- Clara Hartmanshenn (Rutgers)
- Kuriakose Kunnath (New Jersey Institute of Technology)
- Famaz Esmail (Illinois Institute of Technology)



Upcoming Conferences

PARTEC	https://www.partec.info/		
Fluidization XVI	https://www.aiche.org/conferences/fluidization/2019		
International Conference on Gas-Liquid and Gas- Liquid-Solid Reactor Engineering	https://www.journals.elsevier.com/chemical-engineering- journal/announcements/14th-international-conference-on-gas- liquid		
9th International Granulation Workshop	https://www.sheffield.ac.uk/agglom/2019		
International Conference on Bulk Materials Storage, Handling, and Transportation	http://www.icbmh2016.com.au/		
International Conference on Discrete Element Methods	https://mercurylab.co.uk/dem8/		
16th European Symposium on Comminution & Classification	http://alertgeomaterials.eu/wp-content/uploads/2018/09/ESCC -2019-Conference-Leaflet_060918.pdf		

PTF Dinner - Grand Concourse Restaurant

Date: October 31, 2018 (Wednesday)

Time: 6:30pm - 10:30pm

Location: Grand Concourse Restaurant

Address: 100 West Station Square Drive, Pittsburgh, PA 15219

This year's PTF dinner will be at the Grand Concourse restaurant in Pittsburgh, PA. Housed in the beautifully preserved Pittsburgh & Lake Erie Railroad Station, the Grand Concourse restaurant at Station Square is a true testament of grandeur and elegant dining. With a cathedral stained-glass vaulted ceiling, marble columns, and a dramatic staircase, guests are quickly transported to the glamorous side of the Progressive Era with the luxury of a modern day menu. Our award-winning seafood restaurant boasts a fine selection of our signature seafood dinner specials, tender steaks, poultry, and on Sundays, the best brunch in Pittsburgh. Nestled comfortably on the riverfront and overlooking the downtown skyline, Grand Concourse at Station Square will outshine any restaurant near you—and any seafood restaurant Pittsburgh has to offer. Come join us for the most memorable dining experience around.

Cost for dinner is \$85. again this year, and includes a couple of drinks.



Sponsors of the PTF Dinner



a micromeritics^{*} company

In Memoriam - Professor Bob Behringer

Robert P. Behringer, James B. Duke Professor of Physics and member of the Duke community for nearly 50 years, died on Tuesday, July 10, 2018, after a short illness. He was 69 years old.





Behringer is well known for his pioneering work in the physics of granular materials, especially the visualization and quantification of force networks in packed beds and dense flows. His research team used small photoelastic discs which display bi-refringence under strain. This innovative method produced results that were visually beautiful and physically insightful. Detailed analysis of the bi-refringent patterns enables the quantification of stress fields and their dynamics within dense flows. He was active in the use of statistical physics, providing underlying theoretical bases for his work.

Behringer was named a James B. Duke professor of physics in 1994 and served as chair of the physics department from 1999 to 2002. His work earned him a myriad of awards, including an Alfred P. Sloan Fellowship and the Jesse Beams Award from the American Physical Society.

He was also named Chair the American Physical Society's Topical Group on the Physics of Climate for his fair and balanced leadership style, and served as editor-in-chief of the journal Granular Matter. To mark his 65th birthday in 2013, the Physics department hosted a granular materials colloquium called "BobFest," and Granular Matter published a special issue with 20 articles from Behringer and his students.

Bob is also well known for his collaboration with engineering and industry. He joined the International Fine Powder Research Institute (IFPRI) as a member of its Powder Flow Working Group in 2005, working with other academics and industrial representatives to chart a forward path for applied research in dense granular flows. In the Working Group, Bob framed the dense flow challenge as a dynamic system of flow and stress fields; while it may be a complex problem, he reduced the complexity to concepts that are both simple and rational. His physical and deductive insights have inspired engineers in the solids processing industries to step forward from a legacy "black-box" empiricism toward more rational measurement, control and manipulation of flow and stress fields within unit operations.

Bob's collaborative work with industry included an IFPRI research project on the "Dynamics and Rheology of Hopper Flow." To further the research, he connected IFPRI with the NSF, engaging colleagues to model the dynamics and fluctuations associated with transient jamming in converging flows.

Reflecting on Bob's contributions, we can only regret that he left us too soon. He remained active in research, extending the 2D methods to 3D flows of more direct interest to the engineering community, as well as pursuing other novel ideas for sensor technologies and data analysis. His legacy is indeed multifaceted; one of kindness, collaboration, creativity and instinctive motivation toward sharing the beauty and productive application of physics. His passion for mentoring students was unmatched, and his dedication to inclusivity was exemplary. Fortunately, he has inspired so many students and colleagues to carry his legacy forward.

In Memoriam - Professor Dr.-Ing. Jörg Schwedes

We mourn Prof. Dr.-Ing. Jörg Schwedes who left us on August 21, 2018 at the age of 80.

We have lost an outstanding researcher, an activist for international collaboration, a profound university teacher, a great mentor for the powder technology community, an outstanding tutor for his former students, and for many of us also a very good friend with a great and friendly personality. Our sympathy goes to the ones he left behind, namely his family and friends.

Born in 1938 in Berlin Jörg Schwedes studied process engineering/technology at the Karlsruhe Institute of Technology (KIT, formerly known as TH Karlsruhe) with Prof. Hans Rumpf – being among the first generation of students of the Rumpf School of Mechanical Process Technology. He was the first researcher in Germany working on flowability of powders using a Jenike shear tester and then developing his "simple shear apparatus". By writing a state-of-the-art survey/compendium on flowability of powders he created awareness for this topic in Germany and for the ability to solve flow problems on a scientific basis. He received his Ph.D. degree in 1971. Later, while working in research



and application technology at the German chemical company Bayer AG, he introduced the knowledge of silo design into the chemical industry and created a wide data base on shear test data. He made this approach a standard procedure in the chemical industry.

After returning to the academic arena by becoming professor at the Technische Universität (TU) Braunschweig (Institute of Technology), he was heading the Institute for Mechanical Process Technology for almost 30 years. He continued research on silo technology (loads, feeders,), shear testers and flowability (true biaxial tester, anisotropy, ring shear tester, ...) and comminution (cryogenic & wet comminution of mineral and bio-materials,...). His input into the German DIN 1055-6 committee on silo loads remains unique. Besides his scientific impetus, he always kept close to solving industrial problems. This consulting work resulted in founding the company Schwedes + Schulze Schüttguttechnik – the leading European consulting business on silo design, flow problems and solids handling. In order to spread his experience to industry, he organized an annually reoccurring university course on silo design.

During his time at the University from 1976 to 2005, he focused his research work mainly on bulk solids characterization and handling, silo design for flow as well as wet milling using stirred media mills. However, he was very active not only in his own research topics, but also in teaching as well as university self-administration and committee work. For example, Joerg (in German: Jörg) Schwedes was Vice-President of the University from 1982 to 1984, and Dean of the Faculty of Mechanical Engineering from 1989 to 1991. He loved to teach and won the best teaching award of the University named "Examine the Prof" a few times. A very important contribution to the University and students was the setup of an European student exchange program with other European Universities called "ECTS" (European Credit Transfer System). In this program the mutual acceptance and translation of credits and examination results (marks) was setup between several European Universities. This program established the basis for the until today very successful Erasmus program.

In addition to promoting his home university, he was very active in the German research community. Among others, he was heading the German working party on "Agglomeration and Bulk Solids Handling" for several years and was a central member of the analogous European working party. Moreover, Joerg Schwedes was very active for the German Research Foundation, among others as main reviewer in the field of Mechanical Process Technology. An important achievement for the German particle processing community was his establishment of the priority program of the German Research Foundation (DFG) on production, classification, separation and characterization of fine particles below 10 µm. This priority program acquired by Joerg Schwedes and lasting six years brought the German Particle Technology Community much closer together and was the basis for other priority programs on Particle Technology following the one headed by Joerg Schwedes. At the Technische Universität Braunschweig Joerg Schwedes setup a DFG research unit which was financed by the German Research Foundation on disperse systems in biotechnological

processes. Such strong collaborative interaction of process engineering and biotechnology is still alive at the TU Braunschweig.

Since his days at Karlsruhe, he was enthusiastic about the exchange of scientists from Eastern Europe through international conferences and the EFCE Working Party on the Mechanics of Particulate Solids (WPMPS) – which he scientifically formed/dominated for many years. Thus, it was a natural choice for him to promote process technology education in Italy after his retirement.

The Particle Technology Forum honored Prof. Schwedes by presenting him the Lifetime Achievement Award in 2005.

Throughout his academic career he published more than 500 papers. He was an invited and well-known speaker at international conferences. He became the supervisor of almost 50 PhD students and numerous masters and bachelors students. Many of his students have become leading engineers or researches in industry or at universities.

He has gained a very high level of authority and respect through his open personality in combination with his outstanding competence with all his students. They all, still today, refer to him still as esteemed authority in every way. He enabled his students to participate in international conferences and committee work, thus qualifying them for the globalized industry.

The academic and industrial community of Mechanical Process Technology has lost an excellent scientist and expert in the field of bulk solids handling, silo design, and comminution technology. We will miss him and his analytical mind forever, and we will always remember him with honor and respect.

Prof. Dr.-Ing. Arno Kwade, successor of Jörg Schwedes at the TU Braunschweig Dr.-Ing. Hermann Petersen, President of Alumni association Dr.-Ing. Harald Wilms, first Ph.D. student of Jörg Schwedes in solids handling Prof. Dr.-Ing. Dietmar Schulze & Harald Heinrici, Schwedes + Schulze Schüttguttechnik



The John C. Chen Endowment for Young Professional Leadership



To pay lasting tribute to the late John C. Chen, the Carl R. Anderson Professor Emeritus of Chemical Engineering at Lehigh University and AIChE® President in 2006, the AIChE Foundation has established an endowment fund in his memory to support the leadership development of young professional chemical engineers.

Family and friends established this endowment to honor John's passion for education, leadership and his lasting impact on the chemical engineering profession. The endowment will provide scholarship funds to support, in perpetuity, the leadership development training of two selected AIChE young professional members each year. The inaugural scholarships will be awarded at the 2018 AIChE Annual Meeting in Pittsburgh.

As of May 1, \$70K has been raised toward the endowment goal of \$100K for 2018.

For more information about how to get involved and/or make a contribution please contact

Stephanie Viola Development Director office: 646.495.1342 email: stepv@aiche.org



www.aiche.org/giving/johnchen

Treasurer's Report (2017-2018)

NY ACCOUNT	Starting	Income	Expenses	Balance
monthly fee (08/31/2016)			\$18.00	\$4,631.16
monthly fee (09/30/2016)			\$18.00	\$4,613.16
monthly fee (10/31/2016)			\$18.00	\$4,595.16
monthly fee (11/30/2016)			\$18.00	\$4,577.16
monthly fee (12/30/2016)			\$18.00	\$4,559.16
monthly fee (1/31/2017)			\$18.00	\$4,541.16
check from NJ account to avoid monthly fees (2/17/2017)		\$4,000.00		\$8,541.16
monthly fee (2/28/2017)			\$18.00	\$8,523.16
University of Delaware payment (6/27/2017) - a mistake		\$7,000.00		\$15,523.16
retum settlement to U Delaware (10/4/2017)			\$7,000.00	\$8,523.16
Totals as of 10/2018	\$4,649.16	\$11,000.00	\$7,126.00	\$8,523.16

NJ ACCOUNT	Starting	Income	Expenses	Balance
Sponsor wire transfer from Freem an Technology for dinner received 10/11/2017)		\$2,000.00		\$12,747.36
Sponsor check from Jenike for dinner (received 11/9/2017)		\$2,000.00		\$14,747.36
Sponsor check from ANSYS for award (received 11/9/2017)		\$1,257.00		\$16,004.36
Sponsor check from PSRI for aw ard (received 11/20/2016)		\$1,257.00		\$17,261.36
Sponsor check from U Pittsburgh for award (received 11/20/2017)		\$740.00		\$18,001.36
Sponsor check from CPFD for bus tour (deposited 1/8/2018)		\$2,000.00		\$20,001.36
Totals as of 10/2018	\$10,747.36	\$9,254.00	\$0.00	\$20,001.36

Funds obtained through advertisements in the PTF Newsletter (as of 10/2018):

Organization	Description	Income
Coperion K-Tron	A half page advertisement in Summer 2015 Edition	\$250.00
	Check received in NY account on 11/17/2015	
Kansas State University	A half page advertisement in Summer 2015 Edition	\$250.00
	Check received in NY account on 11/17/2015	
Coperion K-Tron	A half page advertisement in Fall 2015 Edition	\$250.00
	Check received in NY account on 2/17/2016	
University of Delaware	A full page advertisement in Fall 2015 Edition	\$500.00
	Check received in NY account on 4/7/2016	
Coperion K-Tron	A half page advertisement in Fall 2016 Edition	\$250.00
	Check received in NJ account on 2/2/2017	
		Total: \$1500.00

Treasurer's Report (2017-2018)

AIChE ACCOUNT	Starting	Inc	ome	Expenses	Bal	ance
Dues Income - Divisions (8/2017)		\$	1,020.00		\$	17,514.54
Registration Income - Special Events (8/2017)		\$	1,530.00		\$	19,044.54
Dues Income - Divisions (9/2017)		\$	600.00		\$	19,644.54
Registration Income - Special Events (9/2017)		\$	5,015.00		\$	24,659.54
Site Costs - Shuttle Buses (Annual Meeting) (9/2	017)			\$ 1,950.00) \$	22,709.54
Site Costs - Special Event (Annual Meeting) (9/20)17)			\$ 1,100.00) \$	21,609.54
Dues Income - Divisions (10/2017)		\$	900.00		\$	22,509.54
Registration Income - Special Events (10/2017)		\$	2,890.00		\$	25,399.54
Corp Sponsorship Inc - Dow (10/2017)		\$	700.00		\$	26,099.54
Site Costs - Special Event (Annual Meeting) (10/2	2017)			\$ 10,663.83	3 \$	15,435.71
Dues Income - Divisions (11/2017)		\$	495.00		\$	15,930.71
Registration Income - Special Events (11/2017)		\$	765.00		\$	16,695.71
Delivery Service (11/2017)				\$ 17.14	\$	16,678.57
Site Costs - Special Event (Annual Meeting) (11/2	2017)			\$ 352.60) \$	16,325.97
Monetary Awards (Posterx2, George Klinzing Bes	st PhD, Service, SA	BIC Y	oung, Thomas	\$ 6,500.00) \$	9,825.97
Dues Income - Divisions (12/2017)		\$	570.00		\$	10,395.97
Corp Sponsorship Inc - Shell and SABIC (12/2	2017)	\$	2.514.00		\$	12,909.97
Monetary Awards (Fluidization) (12/2017)			,	\$ 1,000.00) \$	11,909.97
Site Costs - Special Event (Annual Meeting) (12/2	2017)	_		\$ (384.00)) \$	12,293.97
Invest Inc - Interest (12/2017)		\$	1,909.30		\$	14,203.27
Printing Signs (12/2017)				\$ 138.2	′\$	14,065.00
Dues Income - Divisions (1/2018)		\$	555.00		\$	14,620.00
Corp Sponsorship Inc - Merck (1/2018)		\$	1,500.00		\$	16,120.00
Site Costs - Special Event (8th World Congress)	(1/2018)		,	\$ 5,000.00) \$	11,120.00
Dues Income - Divisions (2/2018)		\$	210.00		\$	11,330.00
Promotion-email (2/2018)				\$ 0.74	\$	11,329.26
Site Costs - Special Event (8th World Congress)	(2/2018)			\$ 500.00) \$	10,829.26
Dues Income - Divisions (3/2018)		\$	525.00		\$	11,354.26
Monetary Awards (Poster) (3/2018)				\$ 500.00) \$	10,854.26
Dues Income - Divisions (4/2018)		\$	240.00		\$	11,094.26
Annual meeting expense and Award plaques (4/2	018)			\$ 612.02	2 \$	10,482.24
Promotion-email (4/2018)				\$ 0.4	\$	10,481.80
Dues Income - Divisions (5/2018)		\$	105.00		\$	10,586.80
Dues Income - Divisions (6/2018)		\$	165.00		\$	10,751.80
Dues Income - Divisions (7/2018)		\$	165.00		\$	10,916.80
Registration Income - Special Events (7/2018)		\$	170.00		\$	11,086.80
Dues Income - Divisions (8/2018)		\$	840.00		\$	11,926.80
Registration Income - Special Events (8/2018)		\$	1,360.00		\$	13,286.80
Totals as of 10/2018	\$ 16 494 54	\$	24 743 30	\$ 27951.04	\$	13,286,80

Post Doc Position at IFPEN-Lyon (France)

Multiphase Jet Penetration in Gas-Solid Fluidized Beds

Location:

IFP Energies nouvelles (Solaize, Rhône, France), Process Design and Modeling Division – Chemical Engineering and Technology Department (R124)

Supervisor / Contact:

Dr. Sina TEBIANIAN (sina.tebianian@ifpen.fr) Chemical Engineering and Technology Department IFP Energies nouvelles - Etablissement de Lyon Rond-point de l'échangeur de Solaize BP 3 69360 Solaize Tel: 04 37 70 32 12

Field of Work:

Thermochemical conversion of solid fuels in fluidized beds is of growing interest for processes such as catalytic pyrolysis, gasification, combustion or chemical looping. A broad range of conventional (e.g. coal or petcoke) and renewable solid fuels (e.g. agricultural and urban wastes) may be utilized in this kind of multiphase reactors that present unique features such as 1) excellent heat transfer rate; 2) nearly isothermal conditions; 3) ease of solids handling; and 4) flexibility in treating wide solid size distributions.

Heating rate, mass transfer and reaction efficiency in gas-solid fluidized beds are directly related to the mixing of solid fuel with the bed material. Some examples are:

- For thermal conversion of solid fuels in processes such as gasification, pyrolysis or combustion, rapid and efficient mixing of the solid fuel with the fluidization medium is a prerequisite for reliable and trouble-free operation and prevent hot spots, solids agglomeration and plugging;
- For thermal conversion of solid fuels with high volatile matter, the produced gas contributes to the fluidization conditions and uniformity. Moreover, chemical pathways and product yields associated with gas generation are directly related to the solid injection and mixing conditions and efficiency;
- For catalytic reactions when the catalyst particles are regenerated and re-inserted in the reactor from a side or the bottom, the mixing conditions in the regenerator (spent catalyst with the fluidization medium) or the reactor (regenerated catalyst with the fluidization medium) define the global catalytic activity and therefore, the reaction yield.

The feed injection system dictates the mixing efficiency and operation reliability of the process. The injection system should assure a proper dispersion of the solid fuel avoiding accumulation in the injection line or near the connection to the reactor with a minimum energy consumption. Different injection methods are employed for controlled solid fuel injection. Some instances are screw feeder, rotary valve that may feed the solids directly to the reactor or to a pneumatic line that transports the solids with a high velocity and inject them into the reactor.

Pneumatic injection is one of the methods utilized for solid fuel injection in gas-solid fluidized beds. Solid particles are accelerated by a carrier gas that transports the feed with a relatively high speed into the reactor. Jet penetration is one of the main parameters that indicates the mixing efficiency of the feed with the bed material and its prediction is crucial for proper design and scale up of fluidized bed reactors. Despite the importance of jet penetration, its characterization mainly for multiphase jets has been rarely studied in the literature. This leads to a limited number of scientific correlations that describe the physical phenomena of jet penetration taking into account the governing equations and influencing parameters.

The objective of this postdoc project is to perform an experimental and modeling campaign in order to study and describe the effect of parameters such as solid flux in the injection line, injection nozzle diameter, carrier gas velocity and fluidization gas velocity on multiphase jet penetration in a gas fluidized bed. The injected solids will be dyed with fluorescent material in order to be tracked once injected in the fluidized bed with a novel technique being developed at IFPEN. The penetration length of the injected solids would be estimated using fluorescent probes situated at different distances from the tip of the injection nozzle. The velocity of the particles in the injection line is an important parameter affecting multiphase jet penetration and it will be measured by using optical fiber probes already available at IFPEN. The results of fluorescent probes will be compared with voidage profiles obtained with Electrical Capacitance Tomography employed on the same unit.

The parameters measured with this experimental study will feed a modeling effort in which the transfer phenomena characterizing the system are taken into account for developing correlations that may predict the behavior at different conditions. Additional CFD efforts can also be performed to validate the existing models.

Candiate Profile:

The candidate should have a PhD in Chemical Engineering with knowledge of multiphase reactors and in particular fluidized beds. The candidate must be autonomous and pragmatic with extensive experience in experimental research. Moreover, knowledge of data processing software such as MATLAB, Origin Pro and Labview, and CFD software such as Barracuda is highly appreciated.

To Apply:

Please send your Resume, Motivational letter, Two reference letters and a copy of the first page of PhD dissertation reporting the completion date.

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