THE PARTICLE TECHNOLOGY FORUM (PTF) NEWSLETTER

An American Institute of Chemical Engineers (AIChE) Forum

A Glance at the Newsletter

Editorial

Dear Fellow PTF Members,

I hope you and your families continue to remain safe, healthy, and in good spirits, amidst the ongoing global health crisis. On the one hand, I can personally sympathize and relate to those who are now feeling *pandemic fatigue syndrome*. After all, hundreds

Message from the Chair

As we come to the end of this remarkable year, I hope that you and your families are still safe and healthy and not impacted by the Covid Pandemic. I also hope that you benefited from the excellent article in the Spring Newsletter in working from home and COVID safety. As we get ready for the virtual Annual meeting, our newsletter is more important that ever to communicate details of the Annual meeting to you. Thanks very much to our editor Mayank Kashyap for diligently getting it done.

The casualties of the Pandemic continue to stack up. In this case, we have cancelled the Annual PTF Dinner. But we have rescheduled the awards recognitions to occur during the Awards lectures. We will miss the interpersonal contact, I'm sure, but we will be able to enjoy the information sharing just the same. Additionally, we will plan to recognized folks in person the following year when we are able. The schedule for the award lectures is below.

On Tuesday November 17, we will have two of the speakers (PSRI & Lifetime awards) with pre-recorded talks at 9 am and we will have the live session with the Baron Award lecture and also use that time to announce and "present" our other award winners their awards. We will use what time is left for questions for any of the award lectures.

Our programming committee meetings this year will immediately follow the Baron Award lecture and other award presentations.

of millions of lives all over the globe have changed drastically in the past several months in a way that no one would have imagined a year ago. However, on the other hand, the increase in global COVID-19 cases and deaths by 16 and 6 times, respectively, since I issued the Spring 2020 newsletter, and the fact there is no end in sight *yet* to the pandemic, should be good reasons for us to continue playing our roles in slowing down the spread of the disease. I would like to reemphasize the personal views I had shared earlier that it is our individual and collaborative responsibility to continue maintaining social distancing, wearing a face mask when around others, practicing good hygiene, monitoring our health daily, and following other public health guidelines pertaining to COVID-19 from reliable health officials and sources.

"Coming together is a beginning. Keeping together is progress. Working together is success." – *Henry Ford*

The 2020 AIChE Annual Meeting is around the corner!! As you are aware, this meeting will be 100% virtual. Even though we will not meet in-person this year, we still have the opportunity to share and

Tuesday, November 17

★ Pre-Recorded portion: 9:00am – 10:00am PST
- ✦ Session Title: PTF Prerecorded Award Lectures
  - ➡ 9-9:30am PSRI Fluidization Award – Clive Davies
  - ➡ 9:30-10:00am Elsevier PTF Award for Lifetime Achievements – Madhava Syamlal

★ Conference-wide break: 10:00-10:30am PST

★ Live portion: 10:30am–11:30am PST
- ✦ Session Title: PTF Award Presentations and Baron Award Lecture
  - ➡ 10:30-11am Introduction of all PTF Awardees
  - ➡ 11:00-11:30am Shell Thomas Baron Award in Fluid Particle Systems – Christine Hrenya

★ Programming committee meetings 11:30am-12:30pm PST– in one Zoom meeting with each in a breakout group
- ✦ Particle Technology Forum Area 3A Meeting
- ✦ Particle Technology Forum Area 3B Meeting
- ✦ Particle Technology Forum Area 3C Meeting
- ✦ Particle Technology Forum Area 3D Meeting
- ✦ Particle Technology Forum Area 3E Meeting

We have an excellent slate of officers coming up next year. I am pleased to leave Jim Gilchrist in charge as the new Chairman of the PTF with Reddy Karri as an excellent choice for Vice Chair for the next two years. The new and returning liaisons who have been elected by you are also an excellent representation of our membership. The newly elected liaisons' profiles are later in the newsletter.

Please endeavor to remain healthy and maintain safe practices during this challenging time. We are all under strain of one sort or another. Some in not seeing loved ones, some is seeing too much. Either way, patience and forgiveness of each other is a great "Best Practice" as we go forward.

As I sign off of my last "Chairman's letter", let me say what a privilege it has been to serve as your Vice Chair and Chair for the last four years. I look forward to seeing what the future holds in store for the PTF!

Regards,

Bruce D. Hook, The Dow Chemical Co.

Chair, Particle Technology Forum

witness recent research advancements in the field of particle technology, and celebrate the achievements of our peers who are receiving various awards from AIChE PTF.

Special thanks to Dr. Bruce Hook on behalf of the executive committee (EC) for his leadership and service to the PTF, as he finishes his two-year term as the Chair. We look forward to his continued service in the future. In addition, let us welcome Dr. Maria Tomasone, Dr. Bodhi Chaudhuri, and Dr. Casey LaMarche to the EC, and Dr. James Gilchrist and Dr. S.B. Reddy Karri as the Chair and Vice-Chair, respectively.

This newsletter provides information on the annual meeting, Statement on Diversity and Inclusion, EC election results, and more.

If you would like to contribute to one of the top tangible deliverables for PTF through relevant material in one the upcoming newsletters, please contact me with your ideas.

"Volunteers do not necessarily have the time; they just have the heart." – Elizabeth Andrew

Stay safe!! Stay healthy!! Stay strong!! Stay positive!!

Mayank Kashyap, SABIC

Editor, PTF Newsletter

AIChE Particle Technology Forum Statement on Diversity and Inclusion

Approved at 2019 AIChE Annual Meeting

The AIChE Particle Technology Forum is committed to maintaining a diverse and inclusive community of highly skilled chemical engineering professionals within the environment of the Institute and profession in which all members, regardless of characteristics such as gender identity and expression, race, religion, age, physical condition, disability, sexual orientation, educational level, socioeconomic class, nationality or ethnicity, are valued and respected."

As a global scientific and engineering society, we affirm the international principles that the responsible practice of science, free from discrimination in all of its forms, is fundamental to scientific advancement and human wellbeing, as outlined by the International Council for Science's (ICSU) Statute 51. We also affirm our commitment to an engineering and scientific environment that facilitates the planning, execution, review and communication of engineering and scientific work with integrity, fairness, and transparency at all organizational levels. This extends to our general scientific endeavors–including our professional interactions and engagement with other engineers, scientists, students, trainees, and the general public. We recognize that harm to our profession, our scientific credibility, individual wellbeing, and society at large is caused by not doing so.

To this end, the PTF will implement the principles of diversity, inclusivity, and equity within PTF leadership and membership to build a community across the chemical enterprise. We are committed to quantifying and monitoring our diversity at least annually at the Executive Committee and reported at the general business meeting.

2020 AIChE Annual Meeting - 100% Virtual

Ubiquitous!!

November 16-20, 2020

A Message from AIChE

2020 AIChE ANNUAL MEETING | ASC20 AIChE Annual Student Conference

Dear Colleagues,

In the wake of the current pandemic, AIChE's first concern is for the health and safety of our members, volunteers and staff. AIChE® has therefore made the decision to **hold its 2020 Annual Meeting virtually.** The meeting – which originally had been scheduled to take place in San Francisco, CA, November 15–20 will now be held virtually from **Monday, November 16 through Friday, November 20.** The **Annual Student Conference,** held in conjunction with the Annual meeting, **will take place online November 13–16**.

This new virtual experience, developed by our programming team, including meeting chairs, session organizers, presenters and exhibitors, will ensure that the new format provides you with the valuable experience you expect. As you know, AIChE's Annual Meeting is the **premier forum for chemical engineers interested in innovation and professional growth** as experts cover a wide range of topics relevant to cutting-edge research, new technologies and emerging growth areas. We are excited to bring AIChE's 2020 Annual Meeting to a larger global audience as a virtual event.

The Annual Meeting program will continue to provide virtual meeting attendees with compelling technical sessions, inspiring lectures, and valuable opportunities to network with speakers, exhibitors, and chemical engineering colleagues. Alternating program blocks, consisting of technical sessions and networking events will enable attendees to interact with presenters during Q&As, participate in workshops, attend panel discussions and committee meetings and engage with colleagues in the community.

Among the many benefits of the virtual platform, attendees will enjoy the flexibility of being able to **revisit recordings of the technical sessions** up to one month after the meeting. Full meeting registration will include permanent access to recordings of all available presentations as part of the conference proceedings. Ancillary events, university receptions, and all networking will be set up by AIChE using best practices for platforms and networking. Each event will proceed as listed with modifications for virtual (e.g., dinners will become networking events that will include several options). Staff will contact the responsible person for each ancillary event (as listed in Confex) to make individualized arrangements with your group, beginning the week of September 1.

AIChE has adjusted our registration fees to reflect this new virtual format and the cancellation policy has been adjusted to provide flexibility. Please see the FAQs for more information and watch your email for updates.

Join us in November for our 2020 Annual meeting! AIChE looks forward to providing you with a unique, virtual experience that will enhance your career development and professional growth and to sharing quality time and great programming!

June C. Wispelwey

Executive Director and CEO, AIChE

Particle Technology Forum

2020 AIChE Particle Technology Forum Awards

Elsevier PTF Lifetime Achievement Award

Madhava Syamlal
National Energy Technology Laboratory
U.S. Department of Energy

Dr. Madhava Syamlal is a Senior Fellow for Computational Engineering at the National Energy Technology Laboratory in Morgantown, West Virginia. He received his BS degree in chemical engineering from India Institute of Technology (BHU) and Ph.D. from Illinois Institute of Technology. He worked in industry, including a position at Fluent, before joining NETL. For those in particle technology who perform computational studies, his work as the founding architect of MFIX is extremely well known. MFIX is an open source platform actively being used by researchers in over

70 countries. Dr. Syamlal has been the recipient of many previous awards, notably the 2009 PTF Fluidization Award, three times as the R&D 100 Award and in 2013 he was elected as a Fellow of the AIChE.

He is receiving the 2020 Elsevier PTF Lifetime Achievement Award for his pioneering contributions advancing the capability to model and simulate fluid-particle flows in nature and engineered systems, and for developing the enormously successful open-source platform MFIX.

Thomas Baron Award in Fluid-Particle Systems

Christine Hrenya
University of Colorado

Professor Christine Hrenya is no stranger to the PTF. She obtained her BS in chemical engineering at The Ohio State University and Ph.D. at Carnegie Mellon University with Professor Jennifer Sinclair Curtis. Professor Hrenya's work focuses on bridging micro-level physics and macro-level behavior in fluidization bridging cohesive flow, heat transfer, flow instabilities, and polydispersity. Her research has resulted in over 110 articles, 9 postdocs, and 16 Ph.D. students. Professor Hrenya has contributed greatly in terms of service, including Chairing the 2016 AIChE Annual meeting. She is the recipient of many honors including the AIChE PTF PSRI Lectureship Award in Fluidization, AIChE PTF Service Award, and the first recipient of AIChE PTF Best Ph.D. Award.

She is receiving the 2020 Shell Thomas Baron Award in Fluid-Particle Systems for pioneering contributions bridging micro-level physics and macro-level flow behavior that arise in fluidization and granular flow instabilities, cohesive particle flows, heat transfer and polydispersity.

PSRI Fluidization and Fluid Particle Systems Award

Clive Davies
Massey University

Professor Davies has had a diverse career across industry and academia over a wide spectrum of engineering projects in fluidization and particle technology. With BSc and Ph.D. degrees from Imperial College of Science and Technology, he then performed postdoctoral research at University of Canterbury in Christchurch. He worked several years in industry working in pneumatic systems and various measurement devices. In 2003 he joined Massey University been elected as a Fellow to the Royal Society of New Zealand and a Fellow of the AIChE.

He is receiving the 2020 PSRI Fluidization and Fluid Particle Systems Award for outstanding academic research achievements in powder rheology, technology transfer to the industry, and tireless leadership and service to the international fluidization community.

SABIC Young Professional Award

Greeshma Gadikota
Cornell University

Dr. Greeshma Gadikota is an Assistant Professor and Croll Sesquicentennial Fellow in the School of Civil and Environmental Engineering at Cornell University. Dr. Gadikota directs the Sustainable Energy and Resource Recovery Group. Prior to Cornell, she served on the faculty at the University of Wisconsin – Madison, held postdoctoral research associate appointments at Princeton University and Columbia University, and a research associate

appointment at the National Institute of Standards and Technology (NIST). Her PhD in Chemical Engineering and MS degrees in Chemical Engineering and Operations Research are from Columbia University. Her BS in Chemical Engineering is from Michigan State University. She is a recipient of the DOE CAREER Award, an invited participant in the NAE Frontiers of Engineering, invited speaker at the NAE German-American Frontiers of Engineering Symposium, and was recognized as a Scialog Fellow in Negative Emissions Science.

She is receiving the 2020 SABIC Young Professional Award for advancing in-operando structure-reactivity evolution of particulate multiphase systems using cross-scale X-ray scattering and tomography measurements for energy and environmental applications.

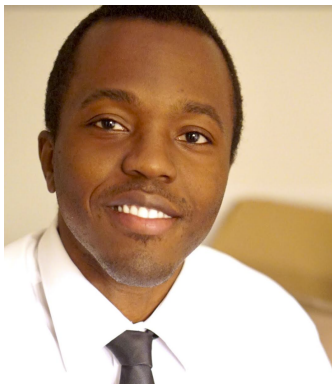
ANSYS Particle Technology Forum Service Award

Karl Jacob
Dow/ University of Michigan

Karl Jacob founded the Solids Handling group at the Dow Chemical Company in 1990 and grew it to the essential Engineering Science function that it is today. At the time and until his retirement he was Dow's acknowledged subject matter expert in solids and particulate storage, transport, drying, coating and most other particle processes. He was a Fellow at Dow, and is an AIChE Fellow, former Director and previous chair of both the Particle Technology Forum and the Solids Handling programming group. While at Dow and since retirement, Karl was a champion for Particle Technology Education for undergraduate engineers. He initiated Particle Technology courses at several universities and since retirement is a Lecturer at the University of Michigan and teaches AIChE Academy courses. He has mentored many engineers in the area of particle technology and good engineering, both inside and outside of Dow, including at least two chairs of the PTF who followed him.

He is receiving the 2020 ANSYS Particle Technology Forum Service Award for a lifetime deserving recognition for his service, not only to the Particle Technology Forum, but to educating the larger engineering community about Particle Technology and in promoting research, scholarship and education in Particle Technology around the world.

George Klinzing Best PhD Award



Paul Mwasame
Dow

Dr. Paul Mwasame received Ph.D. from University of Delaware. He is receiving the 2020 George Klinzing Best Ph.D. Award for his outstanding contributions to the investigation and development of microstructure-based constitutive models of fundamental rheological phenomena in particulate suspensions.

Special Recognition - AIChE Industrial Progress Award

Dr. Brenda Remy, Director of Product Development Analytics at Bristol Myers Squibb, is the recipient of 2020 Industrial Progress Award given by AIChE. She is recognized for her accomplishments in developing scale-down tools that enable robust pharmaceutical process development and elucidate key mechanisms controlling process performance in the drug substance and product areas.

Let us congratulate Brenda for this prestigious recognition!

PTF Committee and Programming Meetings

Meeting	Date/ Time (PST)	Location
PTF Executive Committee Meeting (by invitation)	Monday, November 9, 2020, 10:00 AM	WebEx
PTF General Business Meeting (open to ALL members)	Monday, November 16, 2020, 4:00 PM	vFair Auditorium
PTF Group 3A Meeting	Tuesday, November 17, 2020, 11:30 AM	vFair Auditorium
PTF Group 3B Meeting	Tuesday, November 17, 2020, 11:30 AM	vFair Auditorium
PTF Group 3C Meeting	Tuesday, November 17, 2020, 11:30 AM	vFair Auditorium
PTF Group 3D Meeting	Tuesday, November 17, 2020, 11:30 AM	vFair Auditorium
PTF Group 3E Meeting	Tuesday, November 17, 2020, 11:30 AM	vFair Auditorium

Special Sessions at 2020 AIChE Annual Meeting

2020 Virtual AIChE Annual Meeting Schedule Grid

PST	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday
5:00 / 5:30	Networking	Networking	Networking	Networking	Networking	Networking
6:00 / 6:30		Opening Reception				
7:00 / 7:30		Danckwerts Lecture (Live)	Acrivos Lecture (Live)	Prausnitz Lecture (Live)	Schowalter Lecture (Live)	Live Sessions
8:00 / 8:30		Pre-Recorded+ Presentations & Poster Sessions	Pre-Recorded+ Presentations & Poster Sessions	Pre-Recorded+ Presentations & Poster Sessions	Pre-Recorded+ Presentations & Poster Sessions	Pre-Recorded+ Presentations & Poster Sessions
9:00 / 9:30	Committee Meetings & Workshops	Pre-Recorded Presentations	Pre-Recorded Presentations	Pre-Recorded Presentations	Pre-Recorded Presentations	Pre-Recorded Presentations
10:00		Break				
10:30 / 11:00		Live Sessions	Live Sessions	Live Sessions	Live Sessions	Live Sessions
11:30 / 12:00		Committee Meetings & Break				
12:30 / 13:00	AIChE K-12 STEM Showcase Outreach Competition	Meet the Leaders: Engineering for Inclusion (Live)	Bailey Lecture (Live)	Presidential Lecture (Live)	Oldshue Lecture (Live)	Pre-Recorded Presentations
13:30		Break				
14:00 / 14:30	Honors Ceremony	Pre-Recorded Presentations	Pre-Recorded Presentations	Pre-Recorded Presentations	Pre-Recorded Presentations	Pre-Recorded Presentations
15:00 / 15:30	Annual Business Meeting	Networking	Networking	Networking	Networking	
16:00 / 16:30						

*Schedule Grid as of 10/16/2020

- **PTF Student Workshop - World of Particle Technology**
  2020 AIChE Annual Student Conference: Career Workshops; Saturday, November 14, 2020, 9:45 AM - 10:30 AM PST
- **SABIC Young Professional Award Talk by Greeshma Gadikota**
  Session: Fluidization: Fundamentals; Tuesday, November 17, 2020, 8 AM - 9:00 AM PST
- **Honorary Sessions**
  In addition to our award lectures, the PTF program has several special honorary sessions. These sessions will honor prominent researchers in our field. Due to the virtual format, these sessions have been broken into multiple one hour sessions and spread throughout the week.
  - The accomplishments within particle technology and reaction engineering due to the collaboration of **Prof. Daizo Kunii and Prof. Octave Levenspiel** (Sessions 1, 2, and 3) will be honored with session invited lectures.
  - **Dr. Stuart Daw** (Sessions 1 and 2) will also be honored for his seminal contributions to the applications of nonlinear dynamics and chaos theory for understanding and control of fluidized bed reactors.
  - Sessions will also be held to honor **Prof. Christine Hrenya's** retirement (Sessions 1, 2, 3 and 4) after a career filled with contributions toward understanding particle-laden flows, clustering instabilities, particle cohesion, etc.
  - Area 3C—Solids Flow, Handling and Processing—will honor **Karl Jacob's** extensive contributions to the field and industrial practice (Sessions 1 and 2).
- **Poster Session: Particle Technology Forum**
  Poster Gallery; Wednesday, November 18, 2020, 8:00 AM - 9:00 AM PST
- **Technical Networking Session**
  Wednesday, November 18, 2020, 3:00 PM - 4:00 PM PST

Educational Efforts - PTF Student Workshop

The World of Particle Technology Shared with Future Engineers and Scientists

Presenters:

S.B. Reddy Karri (PSRI)

Ben Freireich (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, virtually.

The hugely successful workshops provided by PTF in the past few years had witnessed several hundred students and professors in attendance on each occasion. We expect to raise the bar even

Photographer: Teresita Kashyap (Dow)

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 live presentations and pre-recorded demonstrations from some of the well-renowned researchers in the field of particle technology:

World of Particle Technology – Fluidization and Solids Handling

2020 AIChE Annual Student Conference

Track 6, Saturday, November 14, 2020, 9:45 AM – 10:30 AM Pacific Standard Time

Particle Technology Forum (PTF)

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 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 pre-recorded demonstrations on fluidization, hopper design, segregation, etc.

Details on the workshop can be found here. Please email Mayank Kashyap (mkashyap@sabic.com) if you have any questions.

The Impact of COVID-19 Pandemic: Reliable New Reality

Ray Cocco

Particulate Solid Research Inc. (PSRI)

Chicago, Illinois, USA

Well, 2020 has been an interesting year, to say the least. Markets are volatile and change almost daily. The workforce is rarely at 100%, delivery schedules are a guess at best, and how all this will fare in 2021 is still a big mystery. Yet, all of us have these challenges, which is why the economy will survive and flourish in time. We are all in the same boat, and that boat is heading in the right direction, although by way of tacking.

PSRI is in a unique position during all this as we have access to our members' challenges from all over the world. Despite politics, we are all experiencing similar challenges with our lives, as is always the case. The year 2020 has certainly presented us with additional challenges. We need to employ precautions to prevent further infections. We are worried about our family and friends, especially those that are most vulnerable. We have our silent cries for those who did not make it, now over a million souls. Then, to make it more complicated, our particle technology operations, training, research, and logistics present us with new challenges.

Many of us involved with particle technology activities are finding that our process and team need to be more robust and reliable than ever. Continuous operations or 24/7 operations was something measured in months or years and is now weeks. You are up and running this week but down next week using a facility designed for non-stop operations with a reliable supply chain. Each startup feels like an adventure as something could go wrong, and in particle technology, if it could go wrong, it will. Furthermore, you will likely be having this challenge well into 2021. Fortunately, you can make your startup much more mundane as long as you account for the physics of time, transient logistics, and equipment at rest. Below are some of those guidelines that I have also noted in the recent Powder and Bulk Engineering journal (http://powederbulk.com) that I hope will make your new reality just a little bit more reliable.

The Physics of Time

If particle technology teaches us one thing, it is that nothing is constant. Entropy, the degree of disorder, sees to that. It means that if you start out with a perfectly ordered system, it will not stay that way unless external energy is applied to that system. In particle technology, you typically see this as a unit operation that did work but now doesn't. That is because even at rest, your particles are still changing with time.

A good example are the solids used in the pharmaceutical, foodstuffs, biomass, etc. could decay or degrade with time resulting in bulk solid that may be more resistant to flow. Biomass would be a good example here as it wants to decay, and if it is decaying in your unit operation, it may be difficult to remove or limit the performance of your equipment. The best strategy here is either to keep it out or to keep passivated. Whatever is causing your solids' decaying with time needs to be

out of the process when you are shut down for an extended period of time. By the way, the decaying process is exothermic and could get very hot and ignite into a fire.

Another example is moisture. Just because you shut down your process with the solids contents being dried does not mean they will stay dry. Suppose the temperature is cycling from hot to cold. Your bulk solids will also be cycling in temperature but at a much slower rate and lagging behind the environment. For example, a small hopper of dry calcium carbonate will be much cooler in the morning, have the whole night to cool down. In the morning, that hopper will be at a lower temperature than the environment around it. The cooler calcium carbonate will be a sink for the morning moisture, much like the dew on morning grass. What happens next is these particles become sticky and less likely flow out of your hopper smoothly (as mass flow instead of funnel flow) or at all.

Another time-driven issue seen in powder technology is the consolidation of stresses. Even if your bulk solids are not decaying or moisture sensitive, issues still can develop when the solids remain at rest. Over time, bulk solids may slowly rearrange themselves into a more compact configuration. This could be due to external vibrations (i.e., motors, compressors, thunder, wind, etc.), thermal swings, or just residual deaeration. What happens is the particles will rearrange themselves with neighboring particles into a more compact configuration. This will likely increase the frictional forces (i.e., the effective angle of internal friction), making flow out a hopper more difficult.

If you suspect this to be one of your 2020 problems, there are ways to make all this work. If decaying is a problem, consider not leaving that material in the afflicted unit when shutting down. Keeping the moisture or oxygen out with a nitrogen purge or inert purge is also effective. This also applied to moisture-sensitive materials. Have a purge of nitrogen or dry air can be effective in limiting moisture condensing on your material during thermal swings. You don't need much gas, just enough to have a slight positive pressure on the unit.

Managing bulk solids consolidation is a bit tricker. It is difficult to prevent. More effect would be to add flow aids such as aerators or air canons to the unit. Vibrating flow aid devices are not recommended for this application as the vibration could just consolidate the bed even more.

Understanding what your bulk solids are doing while "at rest" will help you know what needs to be done to get the process up and running quickly and on-spec.

Transient Logistics

It is unlikely your tried-and-true shutdown and start-up procedures are not effective as they have been in the past. Chances are they were designed for infrequent use, which may have changed now. You need to discuss what frequent start-ups and shutdowns are doing to your productivity with your team. Is shutting down with the units completely full or empty the best scenario. Should purge gases or flow aides be added? Are the valves best in the open or close position? What is cycling doing to the equipment with respect to mechanical stresses? How are those belts and chains holding up? Should we be starting up slow or faster?

There are many questions to ask here; but, if you want the best answers, work with your team and the whole team. Ask them what the challenges or issues are. Ask them what their hunches are.

Sometimes just making an outrageous scenario could spark a meaningful discussion. What if or the five whys tools also work well here. What not to do is not take every suggestion or concern seriously.

This also applies to your safety procedures, which were probably also designed for less frequent start-ups and shutdowns. Again, as a team, current procedures and maybe new procedures need to be discussed. Should additional training need to be added, which could be done during those downtimes.

Equipment at Rest

Moving parts like to keep moving. Frequent start-up and shutdowns do but a lot of stress on your equipment and not just your rotary valves and compressors, but that computer for your process control too. First, your old maintenance schedule is probably not applicable and even getting in the way. It may need to be revised with some maintenance happening on a more frequent bases and hopefully during downtimes. Instruments may need recalibration with each start-up. Your thermocouples are probably just fine, but maybe not your pH sensor? Does your PLC require a buffer of data for process control? The message here is what every your maintenance or operational schedules were, chances are then needed to be re-evaluated.

Closing

Yes, it is the new normal. You are going to have to rethink a lot of tried and true practices. However, if you evaluate your bulk solids behavior over time, re-evaluate your start-up and shutdown procedures, and develop maintenance and operational schedules for today world, you will have a process and team more adaptable, reliable, and productive for 2021.

Be safe and healthy!!

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,
- Becoming a PTF lifetime member so that you don't have to renew membership every year

Become a PTF only member

(Annually $15, Lifetime $150)

If you don't see the PT 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

PTF Award and Dinner Sponsors

ELSEVIER

Lifetime Achievement Award

Thomas Baron Award

ANSYS®

PTF Service Award

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Particle Processing Award

PSRI

Fluidization and Fluid Particle Systems Award

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Young Professional Award

University of Pittsburgh

George Klinzing Best Ph.D. Award

JENIKE & JOHANSON
SCIENCE ENGINEERING DESIGN

PTF Dinner

cpfd® COMPUTATIONAL PARTICLE FLUID DYNAMICS

Student Travel Grants

AIChE PTF Executive Committee Election

In October, the biennial election for new member representatives to the AIChE Particle Technology Forum executive committee was concluded. As academic member representatives beginning a four year term starting in 2021, **Dr. Maria Silvina Tomassone (Rutgers)** and **Dr. Bodhi Chaudhuri (University of Connecticut)** were elected. As industrial member representatives beginning a four year term starting in 2021, **Dr. Mayank Kashyap (SABIC)** and **Dr. Casey (Wyatt) LaMarche (Particulate Solid Research, Inc.)** were elected. On behalf of the AIChE Particle Technology Forum's executive committee, we would like to congratulate the new representatives and all of the very talented and qualified people who chose to run for these positions. We hope that all of you continue to be involved in our organization.

Dr. James Gilchrist (Lehigh University and current PTF vice chair) will be assuming role of the PTF chair in 2021, and **Dr. Bruce Hook (Dow)** will transition into the past chair role. In accordance with our by-laws, the next vice chair was elected among recently industrial member representatives by the executive committee. **Dr. S. B. Reddy Karri (Particulate Solid Research, Inc.)** was elected by the executive committee to serve as vice chair. Please find below the bios of the newly elected/reelected EC.

Academic Member Representatives:

Silvina Tomassone is a full professor at the Department of Chemical and Biochemical Engineering at Rutgers. She has over twenty years of experience in modeling of particulate and molecular systems. Since joining Rutgers, she has worked on experimental nanoparticle synthesis, characterization of pharmaceutical materials, and catalyst particles, and flow dynamics of granular materials. Silvina has authored more than 70 peer reviewed publications, 3 patents, more than 100 conference presentations, and numerous non-peer-reviewed publications, and she has secured federal (from NSF and NIH), state, and industrial research funding exceeding $8M. Her research and scientific accomplishments are well cited with *H-Index of 23* in Google Scholar, and have been recognized through several scientific awards including the NSF-NIH IGERT Award in Nanopharmaceutical Engineering and Science and the Board of Trustees Research Award for Scholarly Excellence from Rutgers University. She is an active faculty member of the Catalyst Manufacturing Consortium at Rutgers and the Pharmaceutical Engineering Program. In parallel to and aligned with her research pursuits, Dr. Tomassone has been recognized as an accomplished teacher and proficient educator through several teaching awards, including the 2017 Professor of the Year in the Chemical and Biochemical Engineering Department, the 2011 Excellence in Teaching Award in the Chemical and Biochemical Engineering Department, and the 2010 Excellence in Teaching 2010 Chemical and Biochemical Engineering Award. She is a senior member of the American Institute of Chemical Engineers and has served as Vice Chair of Area 3 Session at the AIChE Particle Technology Forum from 2007 to 2011.

Bodhi Chaudhuri is a Professor of Pharmaceutics, Chemical Engineering and Materials Science at UConn. He got his PhD in Mechanical Engineering from NJIT after obtaining his MS and BS both in Chemical Engineering from IISc, Bangalore and Jadavpur University, Kolkata respectively. He performed postdoctoral research in Chemical Engineering at Rutgers and has 3 years of industrial

experience. He has published more than 60 journal articles, book chapters, conference proceedings and delivered 45 invited talks in industry/academia in US and abroad. He is an editorial board member of several international journals including *Advanced Powder Technology*. He and his colleagues have garnered more than $10MM of funding from federal, industrial, and private foundations, for research in powder processing, multiphase flow, machine learning and continuous manufacturing of pharmaceuticals. He routinely consults to pharmaceutical, engineering, and biotechnology companies. He actively participates in activities of AIChE as PTF-session chair/co-chairs whilst organizing several international conferences. He received Young Investigator Award from FDA amongst several other prestigious awards. He acted as the Technical Advisor to Epygen Biopharmaceuticals from 2008-2014. He served as the grant review panel member for NSF and ACS. He held the Visiting Professor positions in University of Copenhagen, National University of Singapore, and Monash University, Australia. Congressman Joe Courtney applauded his group's research efforts in US-Congressional Report in 2011.

Industrial Member Representatives:

Mayank Kashyap is a Staff Scientist and subject matter expert (SME) in Particle Technology and Fluidization (PT&F) at SABIC. Mayank has over fifteen years of theoretical, practical, experimental, and computational research experience in PT&F. At SABIC, he leads PT&F research and plant support activities and provides fundamental insight and technical guidance on the operation and design of fluidized bed reactors and solids handling equipment, globally. Mayank has held several leadership positions in the AIChE PTF, including Board Member, Student Workshop Chair, Executive Committee Member, Newsletter Editor, and *Fundamentals of Fluidization I* Session Co-Chair. He was instrumental in establishing the AIChE PTF SABIC Young Professional Award. In addition, he was an Advisory Board member, Area Chair of Education, and Guest Editor for the Special Edition of Powder Technology Journal, for the 8th World Congress on Particle Technology. He served on the elected Technical Committee (TC) at Particulate Solid Research Inc. (PSRI), from 2014-2015. Mayank received Ph.D. in Chemical Engineering from Illinois Institute of Technology (IIT) in 2010. He has published eight (8) first-author papers in international journals, filed eight (8) patent applications, and co-authored a book. He has delivered over twenty presentations at international conferences. Mayank has been honored for his contributions with thirteen awards and recognitions from various organizations, including *2019 SABIC Year-End-Award (CEO Award), 2018 IIT Outstanding Young Alumnus Award*, *2016 SABIC PETCHEM Best Project Award (Executive Vice President Award)*, *2011* and *2012 Ascend to Excellence (APEX) Awards (CEO Awards)*, and the *2012 AIChE PTF George Klinzing Best Ph.D. Award in Particle Technology*.

Casey (Wyatt) LaMarche is a Project Leader at Particulate Solid Research Inc. (PSRI). Prior to joining PSRI, Casey was a postdoctoral research assistant at the University of Colorado in Prof. Christine Hrenya's lab. Casey obtained his PhD in Chemical Engineering from University of Florida and studied the interaction of turbulent sub-sonic jets with dense particle beds with applications to landing rockets on the Moon, Mars and asteroids. Casey's current research projects at PSRI are aimed at developing better first-principals-based understanding of the influence of drag and cohesion on fluidized-bed behavior in various fluidization regimes. Casey has over 15 peer-reviewed publications and presented more than 20 presentations in the field of particle technology. He teaches a session on modeling for fluidization applications during the PSRI

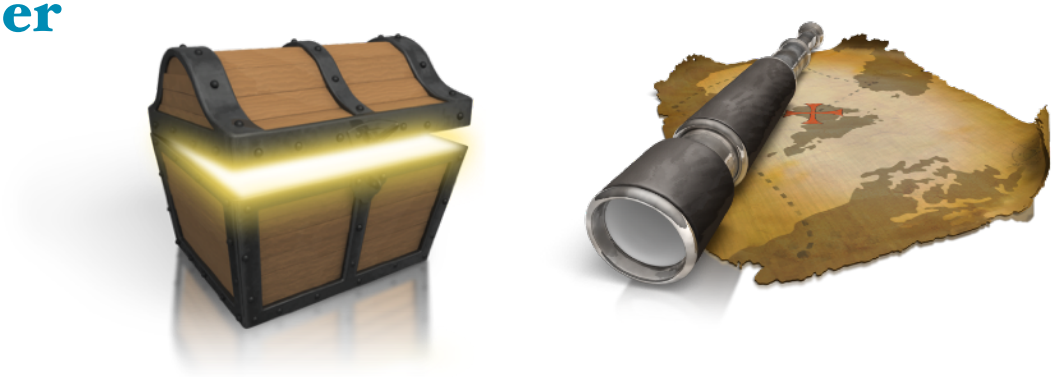
Fluidization seminar and a webinar on modeling discrete element method for PSRI members. Casey is currently a co-chair of the fluidization area in the Particle Technology Forum of the AIChE Annual Meeting and has chaired several conference sessions in past AIChE meetings. He has also served as a judge for the undergraduate poster session at the *8th World Congress on Particle Technology*. Casey has also mentored more than 18 undergraduate researchers for research projects focused on particle technology.

Recap: 2020 Frontiers in Particle Science and Technology (FPST)

The 3rd installment of the AIChE PTF Frontiers of Particle Science and Technology (FPST) occurred virtually on August 17–19, 2020. Dr. Heather Emady (Arizona State University) and Dr. Ben Freireich (Particulate Solid Research, Inc.) co-chaired the conference. The virtual meeting was co-scheduled with the AIChE Spring Meeting & 16th Global Congress on Process Safety. The FPST meeting format is structured to focus on one area of particle technology. This year the focus was Particle Design. Within this topic the meeting had seven sessions–engineered particles, particle delivery forms, emerging techniques in particle characterization, crystallization, industrial applications/case studies, particle design for improved flow, and particle design for energy applications–as well as a keynote and poster session. Our keynote speaker was Dr. Rachel Smith from Sheffield University where she discussed "Designer Particles: Mechanistic Understanding for Process Design". In the virtual format all talks (excluding the keynote) were prerecorded and the speakers were available to respond to questions within a chat interface during the talk. Even in this virtual setting the technical discussion was active and vibrant. A similar format is intended for the AIChE Annual meeting in November 2020. Planning for a future FPST is underway, but no date or topic has been decided.

Illustrative Purposes Only - Circles Not Drawn To-Scale

Treasurer's Report (2019-2020) by Benjamin Glasser



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
return settlement to U Delaware (10/4/2017)			$7,000.00	$8,523.16
Totals as of 10/20/2020	$4,649.16	$11,000.00	$7,126.00	$8,523.16

NJ ACCOUNT	Starting	Income	Expenses	Balance
Sponsor wire transfer from Elsevier for award (received 11/1/2018)		$1,342.00		$22,702.36
Sponsor wire transfer from Freeman Technology for dinner (received 11/2/2018)		$2,000.00		$24,702.36
Sponsor check from PSRI for award (received 4/1/2019)		$1,257.00		$25,959.36
Sponsor check from U Pittsburgh for award (deposited 5/5/2019)		$757.00		$26,716.36
Returned item charge back fee (5/14/2019)			$12.00	$26,704.36
Totals as of 10/20/2020	$21,360.36	$5,356.00	$12.00	$26,704.36

Funds obtained through advertisements in the PTF Newsletter (as of 10/2020):

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

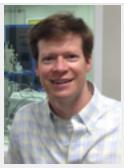
AIChE ACCOUNT	Starting	Income	Expenses	Balance
Dues Income - Divisions (8/2019)		$ 630.00		$ 10,340.21
Registration Income - Special Events (8/2019)		$ 680.00		$ 11,020.21
Monetary Awards (Awardee - Park~Ah-Hyung) (8/2019)			$ 1,000.00	$ 10,020.21
Dues Income - Divisions (9/2019)		$ 750.00		$ 10,770.21
Registration Income - Special Events (9/2019)		$ 4,250.00		$ 15,020.21
Supplies - Special Purpose (Ann'18- PTF Reimb. - DAVE~RAJESH N) (9/2019)			$ 525.96	$ 14,494.25
Dues Income - Divisions (10/2019)		$ 450.00		$ 14,944.25
Registration Income - Special Events (10/2019)		$ 1,020.00		$ 15,964.25
Corp Sponsorship Inc - UPitt (10/2019)		$ 750.00		$ 16,714.25
Dues Income - Divisions (11/2019)		$ 285.00		$ 16,999.25
Registration Income - Special Events (11/2019)		$ 1,445.00		$ 18,444.25
Corp Sponsorship Inc - SABIC (11/2019)		$ 1,257.00		$ 19,701.25
Travel - Volunteers (11/2019) (reimb. for Student Travel by Gilchrist James)			$ 369.00	$ 19,332.25
Site Costs - Special Events (11/2019) (PTF Ticketed Event by Gilchrist James)			$ 7,650.02	$ 11,682.23
Monetary Awards (Dow Particle, SABIC, Elsevier Life, ANSYS Service, George Klinzing, Lecture, Travel, Poster X3) (11/2019)			$ 6,638.00	$ 5,044.23
Dues Income - Divisions (12/2019)		$ 465.00		$ 5,509.23
Registration Income - Special Events (12/2019)		$ 170.00		$ 5,679.23
Corp Sponsorship Inc - J&J, PSRI, ANSYS, Elsevier (12/2019)		$ 5,856.00		$ 11,535.23
Monetary Awards (Travel Award, Kelesidis Georgios A.) (12/2019)			$ 369.00	$ 11,166.23
Invest Inc - Interest (12/2019)		$ 2,126.33		$ 13,292.56
Monetary Awards (Shell Thomas) (12/2019)			$ 1,000.00	$ 12,292.56
Dues Income - Divisions (01/2020)		$ 450.00		$ 12,742.56
Dues Income - Divisions (02/2020)		$ 195.00		$ 12,937.56
Dues Income - Divisions (03/2020)		$ 120.00		$ 13,057.56
Dues Income - Divisions (04/2020)		$ 75.00		$ 13,132.56
Dues Income - Divisions (05/2020)		$ 165.00		$ 13,297.56
Dues Income - Divisions (06/2020)		$ 45.00		$ 13,342.56
Dues Income - Divisions (07/2020)		$ 330.00		$ 13,672.56
Dues Income - Divisions (08/2020)		$ 300.00		$ 13,972.56
Totals as of 10/20/2020	$9,710.21	$21,814.33	$17,551.98	$13,972.56

Particle Technology Forum Organization

✦ *Officers*

Chair
Dr. Bruce Hook
bdhook@dow.com

Co-Chair
Dr. Jim Gilchrist
gilchrist@lehigh.edu



Treasurer
Dr. Benjamin Glasser
bglasser@rutgers.edu

Past Chair
Dr. Raj Dave
dave@njit.edu

✦ *Executive Committee*

Industry	
Michael Molnar michael.molnar@dow.com	
Willie Hendrickson whendrickson@aveka.com	
Dr. Brenda Remy brenda.remy@bms.com	
Dr. Mayank Kashyap mkashyap@sabic.com	

Academic	
Dr. Heather Emady heather.emady@asu.edu	
Dr. Aaron Moment ajm2293@columbia.edu	
Dr. Ah-Hyung Alissa Park ap2622@columbia.edu	
Dr. Richard Lueptow r-lueptow@northwestern.edu	

✦ *Liaisons and Committee Chairs*

CTOC Liaison	Dr. Reza Mostofi	reza.mostofi@honeywell.com
Nominating Committee Chair	Dr. Michael Molnar	michael.molnar@dow.com
PTF Newsletter Committee Chair	Dr. Mayank Kashyap	mkashyap@sabic.com
PTF Webmaster	Dr. Madhusudhan Kodam	madhusudhan.kodam@corteva.com
PTF Student Workshop Chair	Dr. Mayank Kashyap	mkashyap@sabic.com
PTF Programming Chair	Dr. Ben Freireich	ben.freireich@psri.org
PTF Dinner Sponsorship	Dr. Jim Gilchrist	gilchrist@lehigh.edu
PTF Awards Sponsorship	Dr. Reddy Karri	reddy.karri@psri.org
PTF Education Committee Chair	Dr. Shrikant Dhodapkar	sdhodapkar@dow.com
FPST 2020 Chair	Dr. Heather Emady	heather.emady@asu.edu
Staff Liaison	Ms. Darlene Schuster	darls@aiche.org
	Ms. Diane Cappiella	dianc@aiche.org
Accounting	Ms. Leila Mendoza	leilm@aiche.org

✦ *Programming Leadership*

Group 3A: Particle Production and Characterization	**Group 3D: Nanoparticles**
Chair: Dr. Bryan Ennis bryan.ennis@powdernotes.com Co-chair: Dr. Heather Emady heather.emady@asu.edu	Chair: Dr. Timothy Brenza timothy.brenza@sdsmt.edu Co-chair: Dr. Eirini Goudeli eirini.goudeli@unimelb.edu.au
Group 3B: Fluidization and Fluid-Particle Systems	**Group 3E: Energetics**
Chair: Dr. Jia Wei Chew jchew@ntu.edu.sg Co-chair: Dr. Casey LaMarche casey.lamarche@psri.org	Chair: Dr. Travis Sipper tsippel@iastate.edu
Group 3C: Solids Flow, Handling and Processing	
Chair: Dr. Rich Lueptow r-lueptow@northwestern.edu Co-chair: Dr. Yi Fan yfan5@dow.com