# TABLE OF CONTENTS

Welcome Address .................................................................................................................................................4
8th World Congress on Particle Technology Organizing Committee ........................................................................6
Area Chairs ..........................................................................................................................................................7
Notes on Photography and Safety ..........................................................................................................................8
Onsite Information .................................................................................................................................................10
List of Exhibitors ....................................................................................................................................................12
Marriott Orlando World Center Floor Plan ..............................................................................................................14
Convention Center & Meeting Rooms Floor Plans ..................................................................................................15
8th World Congress on Particle Technology Conference Schedule ....................................................................16
Featured Plenary Abstracts ...................................................................................................................................20
Keynote Speakers ..................................................................................................................................................24
8th World Congress on Particle Technology Programming Grids: ........................................................................26
  WCPT8 Plenaries, Keynotes & Poster Sessions .................................................................................................26
  Particle & Bulk Powder Characterization ............................................................................................................27
  Particle Interactions ..............................................................................................................................................27
  Particle Design ....................................................................................................................................................28
  Handling & Processing of Granular Systems .........................................................................................................28
  Particle & Nanoparticle Functionalization ............................................................................................................28
  Particle Classification ..........................................................................................................................................29
  Fluidization & Multiphase Flow ..............................................................................................................................29
  Applications for Sustainable Energy & Environment ..........................................................................................30
  Particle-Based Separations: Fundamentals & Applications ................................................................................30
  Applications of Particle Technology for Pharmaceuticals ..................................................................................31
  Applications of Solids Processing Unit Operations .............................................................................................31
  Special Topics in Particle Technology ..................................................................................................................32
  Education .............................................................................................................................................................32
  Combustible Dust Safety ....................................................................................................................................33
Technical Sessions ..................................................................................................................................................34
Code of Ethics ........................................................................................................................................................59
Volunteer and Meeting Attendee Conduct Guidelines ..........................................................................................60
Conference Calendar ..............................................................................................................................................62
On behalf of the organizing committee, I would like to welcome you to the 8th World Congress on Particle Technology (WCPT VIII) in Orlando, Florida from April 22nd through 26th, 2018. The first World Congress on Particle Technology was in 1986 in Nuremberg, Germany with Kurt Leschonski as chair. Since then it has grown in scale and coverage. The WCPT is currently held every four years all over the world from Nuremberg to Kyoto, Brighton, Sydney, Orlando, Nuremberg, Beijing and to now back in Orlando. For this conference, we have amassed over 100 poster presentations, 630 oral presentations, five plenary speakers, 29 keynote speakers covering 14 different topics in Particle Technology.

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

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

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

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

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

Yours truly,

Dr. Ray Cocco

Particulate Solid Research, Inc. (PSRI)

Chairman of WCPT VIII
Nano-Flow Imaging™ Particle Analysis
by Fluid Imaging Technologies, Inc.

FlowCam Nano

Why rely on data from a signal?

View and measure morphological properties using real digital images. Identify your nanoparticles.

Stop by Booth 210 to learn more.
8TH WORLD CONGRESS ON PARTICLE TECHNOLOGY ORGANIZING COMMITTEE

8th World Congress on Particle Technology Chair

Ray Cocco
Particulate Solid Research, Inc. (PSRI)
Conference Chair

Advisory Board

Alissa Park, Columbia University
Benjamin Amblard, IFPEN
Tim Bell, DowDuPont
Ron Breault, National Energy Technology Laboratory
David Craig, Jenike & Johanson, Inc.
Rajesh Davé, New Jersey Institute of Technology
Shrikant Dhodapkar, The Dow Chemical Company
Thierry Gauthier, IFPEN
Karl Jacob, The Dow Chemical Company
Mayank Kashyap, SABIC
George Klinzing, University of Pittsburgh
Gary Liu, DuPont
Raffaella Ocone, Heriot-Watt University
Eric Shen, ExxonMobil
Al Weimer, University of Colorado at Boulder

AIChE Staff Support

Ilia Kileen, Meeting Logistics
Stéphanie Orvoine-Couvrette, Program Development
Particle & Bulk Powder Characterization
Ben Freireich, Particulate Solid Research, Inc. (PSRI)
Álvaro Ramírez Gómez, Universidad Politécnica de Madrid

Particle Interactions
Stefan Heinrich, TU Hamburg
Shuji Matsusaka, University of Kyoto

Particle Design
Mark Jones, University of Newcastle
Yongsheng Han, Chinese Academy of Sciences

Handling & Processing of Granular Systems
David Craig, Jenike & Johanson
Shrikant Dhodapkar, The Dow Chemical Company

Particle & Nanoparticle Functionalization
Al Weimer, University of Colorado, Boulder
Youngjune Park, Gwangju Institute of Science & Technology

Particle Classification
Junwu Wang, Chinese Academy of Sciences
Benjamin Amblard, IFPEN

Fluidization & Multiphase Flow
Reddy Karri, Particulate Solid Research, Inc. (PSRI)
Tony Bi, University of British Columbia

Applications with Sustainable Energy & Environment
Eric Shen, ExxonMobil
Alissa Park, Columbia University

Particle-Based Separations: Fundamentals & Applications
Fanxing Li, North Carolina State University
Allan Issangya, Particulate Solid Research, Inc. (PSRI)

Applications of Particle Technology for Pharmaceuticals
Brenda Remy, Bristol-Myers Squibb
Chi-Hwa Wang, National University of Singapore

Applications of Solids Processing Unit Operations
Haim Kalman, Ben Gurion University
Bruce Hook, The Dow Chemical Company

Special Topics in Particle Technology
Madhusudhan Kodam, The Dow Chemical Company
Paola Lettieri, University College London

Education
Mayank Kashyap, SABIC
George Klinzing, University of Pittsburgh

Combustible Dust Safety
Konanur Manjunath, The Dow Chemical Company
A NOTE ON PHOTOGRAPHY AND VIDEOGRAPHY FROM THE MEETING ORGANIZERS

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

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

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

Thank you.

SAFETY TIPS

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

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

This security advisory was implemented by AIChE’s Executive Board of the Program Committee (EBPC) with your safety in mind. We welcome any other suggestions you may have to help attendees have a safe and pleasant experience at our meetings.
PSRI has been solving problems in granular-fluid operations for clients all over the world using 200 years of cumulative experience coupled with our state-of-the-art research capabilities. PSRI get the solution before problems get expensive.

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

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

PSRI has state-of-the-art facilities for research on an industrial scale. We have a wide range of research equipment including:
- Risers up to 36-in (0.9-m) dia. by 90-ft (27.4-m) tall,
- Fluidized beds up to 84-in (2-m) dia. by 22-ft (6.7-m) tall,
- Cyclones up to 36-inches (0.9-m) in diameter,
- Conveying lines, feeders, hoppers, etc.

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

Applying the Fundamentals

http://psri.org
Want to Learn More, Please Visit Us at Booth 200
ONSITE INFORMATION

8th World Congress on Particle Technology Registration

Cypress Ballroom 1/2, Orlando World Center Marriott

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

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

Put the Meeting on Your Phone or Tablet.

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

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

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

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

DOWNLOAD THE APP TODAY.
8th World Congress on Particle Technology Exhibit

Crystal Ballroom H, Orlando World Center Marriott

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

8th World Congress on Particle Technology Coffee Breaks

Crystal Ballroom H, Orlando World Center Marriott

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

Lunch Vendor / Station

Cypress Ballroom 1/2, Orlando World Center Marriott

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

WIC Family Accommodations Room

Palms Office, Orlando World Center Marriott

Sunday, April 22 - Thursday, April 26
### 2018 MEETING EXHIBITORS

**As of March 16, 2018**

<table>
<thead>
<tr>
<th>Exhibitor</th>
<th>Booth #</th>
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<td>Anton Parr</td>
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<td>Coupi, Inc.</td>
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<td>CPFD*</td>
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<td>Fluid Imaging Technologies</td>
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<td>Heumann Environmental Company</td>
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<td>Process Systems Enterprise (PSE)</td>
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<td>Sympatec Inc</td>
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<td>Tech4Imaging</td>
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* Company is recruiting.
The International Fine Particle Research Institute (IFPRI), is a unique global network of companies, active in almost all industrial areas, and academics with active research programs in particle science and technology. IFPRI is a non-profit organization.

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

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

Visit Booth #100

FULL MEMBERS
AbiWe
Alamats
AWEKA
Chemours
Corbions
Conning
DuPont
Duracell
Dow Chemicals
Eli Lilly
Energizer
Evonik
FMC Corporation
Hoffman La Roche
Honeywell – UOP
Johnson Matthey
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Novoynemes
Pfizer
Procter & Gamble
Sandoz
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Vertex Pharmaceutical

Visit Booth #100
Join our next Annual General Meeting June 24-28, 2018 in Edinburgh, Scotland.
Contact Willie Hendrickson at whendrickson@aveka.com

www.ifpri.net
| Property Key ➤ Marriott = Orlando World Center Marriott ➤ Crystal = Crystal Ballroom |

<table>
<thead>
<tr>
<th><strong>Sunday, April 22</strong></th>
<th>9:00 AM - 5:00 PM</th>
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<tr>
<td><strong>Crystal A</strong></td>
<td><strong>Computational Fluid Dynamics (CFD) Workshop on Particle Technology (Ticketed Event)</strong></td>
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<tr>
<td>Cypress 1/2</td>
<td>Registration</td>
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| **Monday, April 23** | 
|---------------------|---------------------|
| **Crystal A** | 8:00 - 9:30 AM | 9:30 - 10:00 AM | 10:00 - 11:00 AM | 11:00 - 12:00 PM | 12:00 - 1:15 PM | 1:30 - 3:00 PM | 3:00 - 3:30 PM | 3:30 - 5:00 PM |
| Sessions | Sessions | Sessions |
| **Crystal B** |  |
| **Crystal C** |  |
| **Crystal D** |  |
| **Crystal E** |  |
| **Crystal F** |  |
| **Crystal G** | **Plenary:** Contact Charging in Granular Materials Heinrich Jaeger, *University of Chicago* | **Plenary:** Mesoscience - Opening a New Paradigm of Particle Technology Jinghai Li, *Chinese Academy of Sciences* |
| **Crystal H** | Exhibit Setup | Coffee Break | Exhibits & Lounge | Exhibits & Lounge | Lunch Break | Exhibit & Lounge | Coffee Break | Exhibits & Lounge |
| **Crystal J1** | Sessions |  |
| **Crystal J2** |  |
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| Cypress 1/2 | Registration |
## Tuesday, April 24

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**Plenary:**
Nature-Inspired Chemical Engineering - a Pathway to Innovation in Particle Technology
Marc-Olivier Coppens, University College London

Coffee Break
Exhibits & Lounge
World Congress on Particle Technology Poster Session
Exhibits & Lounge
Coffee Break
Exhibits & Lounge
Sessions
Sessions
Sessions
Registration
## Conference Schedule

### Wednesday, April 25

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<td>Crystal G</td>
<td>Exhibits &amp; Lounge</td>
<td>Coffee Break</td>
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<td>Student Poster Session</td>
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<td>WCPT8 Banquet: Reception: 7:00 - 7:30 PM Banquet: 7:30 - 10:00 PM</td>
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FEATURED EVENTS: PLENARIES

Monday, April 23, 2018

10:00 AM - 11:00 AM • Crystal Ballroom G
Contact Charging in Granular Materials
Heinrich M. Jaeger, University of Chicago

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

11:00 AM - 12:00 PM • Crystal Ballroom G
Mesoscience: Opening a New Paradigm of Particle Technology
Jinghai Li, Chinese Academy of Sciences

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

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

The presentation will also give a perspective on mesoscience. It is believed that more evidence will be needed from various disciplines, particularly, from the field of particle technology where mesoscale phenomena occur everywhere such as in formulating and processing particles. The development of mesoscience will enable our capability in particle design, rational synthesis, smart massive production and system optimization due to its underlying principle to bridge unit scales and system scales. In contributing more evidence to mesoscience in exploring its universality, in return, the knowledge, tools and methods in particle technology will be upgraded to a new paradigm. In such a paradigm, the theory, computation and experiment at mesoscales will be dominant, and the virtual process engineering will be enabling.
10:30 AM - 11:30 AM • Crystal Ballroom G

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

Marc-Olivier Coppens, University College London

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

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

For applications, we will consider problems in gas-solid fluidization, as well as in the design of hierarchically structured particles, which combine nano-confinement effects and optimized transport across length scales. The NICE approach leads to unexpected, out-of-the-box solutions (innovation), but also to new fundamental insights in, for example, fluidization, especially to tackle outstanding questions in particle technology that revolve around mesoscopic physics, which are key for engineers to translate science at the microscopic scale to the macroscopic world of applications.
Wednesday, April 25, 2018

10:30 AM - 11:30 AM • Crystal Ballroom G
Towards Sustainable Energy and Materials: Carbon Capture and Conversion using Novel Liquid-like Nanoscale Hybrid Particulate Systems
Ah-Hyung (Alissa) Park, Columbia University

The atmospheric concentration of CO$_2$ has naturally fluctuated on the timescales of ice ages. Concerns, however, stem from the recent dramatic increase in CO$_2$ concentration, which coincides with global industrial development. This rise is mainly due to the high use of fossil fuels during power generation and chemical production. In order to meet the ever-increasing global energy demands while stabilizing the CO$_2$ level in the atmosphere, the development of carbon capture, utilization and storage technologies is one of the critical needs. In particular, there has been significant efforts to develop CO$_2$ capture solvents and some have shown very promising results. For example, amine-based aqueous solvents can effectively and selectively capture CO$_2$ from flue gas of coal-fired power plants. Unfortunately, the energy requirement for the current aqueous solvent systems is still considered to be too high. Thus, efforts have been focused on the development of second and third-generation CO$_2$ capture solvents which are often water-free. Nanoparticle Organic Hybrid Materials (NOHMs) are a new class of organic-inorganic hybrids that consist of a hard nanoparticle core functionalized with a molecular organic corona that possesses a high degree of chemical and physical tunability. NOHMs are liquid-like, non-volatile and stable over a very wide temperature range, which make them interesting materials for various energy and environmental applications. While their CO$_2$ capture efficiency and selectivity are great, like other anhydrous CO$_2$ capture solvents, NOHMs suffer from high viscosity. Thus, an innovative encapsulation system has been developed to create large gas-liquid interfaces for CO$_2$ capture using these viscous solvents and encapsulated solvents show greatly improved CO$_2$ capture rates. Furthermore, it has recently been discovered that NOHMs have interesting electrolyte properties which may allow the CO$_2$ capture to be pulled by the in-situ CO$_2$ conversion reactions. The development of these unique particulate systems will not only advance CO$_2$ capture materials design but also introduce unique particle technology research opportunities in various fields.

Thursday, April 26, 2018

10:30 AM - 11:30 AM • Crystal Ballroom G
An Industrial Perspective on the Future Needs in Solids Processing Research and Education
Karl Jacob, The Dow Chemical Company

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

Absolutely nothing if you are content seeing only part of the picture.

Unlike traditional analytical techniques, with the STEP-Technology™ you can analyze your whole sample, top to bottom, for particle size, stability, multi-modal distributions, sedimentation, creaming, flocculation, shelf-life, sediment resuspendability, filterability, ...... Well, you get the whole picture.

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8TH WORLD CONGRESS ON PARTICLE TECHNOLOGY KEYNOTES

MONDAY, APRIL 23, 2018

8:00 AM - 9:30 AM

Cyclone and Hydrocyclone
Crystal Ballroom C

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

Fundamentals of Fluidization I
Crystal Ballroom F

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

Particle-Based Separations Keynote I
Crystal Ballroom J1

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

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

1:30 PM - 3:00 PM

Applications Keynote I: Particles in Contact
Crystal Ballroom P

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

Applications of Particle Technology for Pharmaceuticals Keynote
Crystal Ballroom J1

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

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

Chris Sinko, Bristol-Myers Squibb

Fundamentals of Fluidization II
Crystal Ballroom F

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

Particle Sorting & Filtration I
Crystal Ballroom C

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

3:30 PM - 5:00 PM

Education Keynote
Crystal Ballroom J2

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

Particle-Based Separations Keynote II
Crystal Ballroom J1

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

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

Particle Design Keynote
Crystal Ballroom Q

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

4:10 PM: Unifying Principles of Product Design
Wolfgang Peukert, Friedrich-Alexander-Universität Erlangen-Nürnberg
TUESDAY, APRIL 24, 2018

8:15 AM - 9:45 AM
Industrial Applications of Fluidized Beds and Fluidization of Fine Particles
Crystal Ballroom F

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

1:30 PM - 3:00 PM
Applications Keynote II: Dynamic Solids Flowsheeting
Crystal Ballroom P

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

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

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

1:30 PM - 3:45 PM
Applications for Sustainable Energy & Environment Keynote
Crystal Ballroom K

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

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

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

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

WEDNESDAY, APRIL 25, 2018

8:15 AM - 9:45 AM
Computational Aspects of Fundamentals of Fluidization
Crystal Ballroom F

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

1:30 PM - 3:00 PM
Computational Approaches in Fluidization Fundamentals I
Crystal Ballroom F

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

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

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

THURSDAY, APRIL 26, 2018

8:15 AM - 9:45 AM
Computational Methods for Industrial Fluidization
Applications & Process Scale-Up I
Crystal Ballroom F

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

8:15 AM: Electrostatics of Dry Powder Aerosols for Inhalation
Philip Chi Lip Kwok, The University of Sydney
### 8th World Congress on Particle Technology Plenaries

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

### 8th World Congress on Particle Technology Keynotes

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<td>Computational Methods for Industrial Fluidization Applications &amp; Process Scale-Up I*</td>
<td>Marriott</td>
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<td>126</td>
<td>Electrification and Charge Control I*</td>
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### 8th World Congress on Particle Technology Poster Sessions

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* This session is co-sponsored by one or more programming groups
### Particle & Bulk Powder Characterization

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<td>3D Printing and Characterization of Particulate Materials</td>
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<td>24</td>
<td>Particle Morphology, Size, Density and Surface Texture Characterization I</td>
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<td>Micro-Macro Characterization, Relationships Modelling and Engineering Applications</td>
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<td>Characterization of Nanoparticles II</td>
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</tbody>
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### Particle Interactions

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<th>Session #</th>
<th>Session Title</th>
<th>Property</th>
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### Particle Design

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### Handling & Processing of Granular Systems

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<td>Multi-Phase Granular Systems - Handling and Processing</td>
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<td>Recent Advances in Dust Control and Safety</td>
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<td>Segregation and Mixing - Modeling, Simulations and Applications I</td>
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<td>Modeling and Simulation of Bulk Solids and Granular Systems</td>
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<td>Finite Element Modeling of Granular Materials</td>
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<td>Design and Analysis of Hoppers, Silos, Chutes &amp; Feeders - Theory and Practice</td>
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<td>Instrumentation, Control and Measurement Systems in Bulk Solids Systems in Processing Plants</td>
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</table>

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### Particle & Nanoparticle Functionalization

<table>
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<td>Characterization of Functionalized Particles and Nanoparticles I</td>
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<td>Particle and Nanoparticle Functionalization for Biomedicine and Nutrition II</td>
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### Particle & Nanoparticle Functionalization

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<td>Particle and Nanoparticle Functionalization for Environmental Applications II</td>
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### Particle Classification

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

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### Fluidization & Multiphase Flow

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

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### Fluidization & Multiphase Flow

<table>
<thead>
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<td>Thursday</td>
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<td>Computational Methods for Industrial Fluidization Applications &amp; Process Scale-Up I (Invited Talk)</td>
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<td>Transport Phenomena and Reactor Performance I</td>
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<tr>
<td>Thursday</td>
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### Applications for Sustainable Energy & Environment

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<th>Session Title</th>
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### Particle-Based Separations: Fundamentals & Applications

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<th>Session #</th>
<th>Session Title</th>
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## Applications of Particle Technology in Pharmaceuticals

<table>
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## Applications of Solids Processing Unit Operations

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### Applications of Solids Processing Unit Operations

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### Special Topics in Particle Technology

<table>
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<th>Time</th>
<th>Session #</th>
<th>Session Title</th>
<th>Property</th>
<th>Room</th>
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### Education

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<th>Session Title</th>
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## Combustible Dust Safety

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

* This session is co-sponsored by one or more programming groups
Barracuda® — flow regimes; Introduction to has the ability to fluidize particles riser, standpipe and cyclone that demonstration unit comprising a fluidization; Plexiglas

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

Sunday, Apr 22, 9:00 AM


10:40 Break

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

12:00 Lunch Break


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

2:30 Break

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

3:30 Break

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

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

(2) 3D Printing and Characterization of Particulate Materials Monday, Apr 23, 8:00 AM

Marriott, Crystal A

Karen Hangood, Chair Jamie Clayton, Co-Chair Sponsored by: Particle & Bulk Powder Characterization

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

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

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

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

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

9:15 Paper 2f: Comparison of Different Flow Assessments for Selective Laser Sintering Powders — Elke Riedl, Katja Hartmann, Denis Schütz

(3) Applications Monday, Apr 23, 8:00 AM

Marriott, Crystal E

Craig Wheeler, Chair Sponsored by: Particle Design

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

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

8:40 Break

9:00 Paper 3c: High-Shear Granulation: An Investigation into the Kinetics of Granule Consolidation — Stefan A. Litster, Rachel Smith


9:20 Discussion

(4) Cohesion & Adhesion I Monday, Apr 23, 8:00 AM

Marriott, Crystal D

Stefan Ludwig, Chair Urs A. Peuker, Co-Chair Sponsored by: Particle Interactions

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


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

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

9:20 Discussion

(5) Cyclone and Hydrocyclone (Invited Talk) Monday, Apr 23, 8:00 AM

Marriott, Crystal C

Michael Kranzer, Co-Chair Sponsored by: Particle Classification

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


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

9:05 Paper 5d: Hydrocyclone Experiments and Design Equations for Produced Water Desanding Operation — Ilaria Martana, Ivan Saracino, Serena De Maria, Diego Barletta, Massimo Poletto
(6) Energy Conversion Process Fundamentals I
Monday, Apr 23, 8:00 AM
Marriott, Crystal K
Ning Yang, Chair
John N. Kuhn, Co-Chair
Sponsored by: Applications for Sustainable Energy & Environment
8:00 Paper 6a: Fluidized Bed Torrefaction of Biomass Pellets: Process Performance and Product Quality — Paola Brachi, Riccardo Chirole, Francesco Miccio, Michele Miccio, Giovana Ruoppolo

8:30 Paper 6b: A Novel Model to Forecast the Yield and Composition of the Pyrolysis Products: Reaction Kinetics and Hydrodynamics Study Novel Model to Forecast the Yield and Composition of the Pyrolysis Products: Reaction Kinetics and Hydrodynamics Study — Shuli Shen, Avi Tomography — Ye Shen, Avi Uzi, Chi-Hwa Wang

(7) Fundamentals of Fluidization I (Invited Talk)
Monday, Apr 23, 8:00 AM
Marriott, Crystal F
Marc-Olivier Coppens, Chair
Ali Akhavan, Co-Chair
Sponsored by: Fluidization & Separations
8:00 Paper 7a: A Hydrodynamic Study of Subway Grating and Disk and Donut Trays in a 0.6-m Diameter Fluidized Bed Stripper — Alan Issangya, S. B. Reddy Karri, T. M. Knowlton, Ray Cocco, Ben Freireich
8:22 Paper 7b: Exceptional Intruder Sphere Sinking Due to Local Fluidization of Apparently Fixed Powder Bed — Jun Oshifan, Toshihisa Sasaki, Takuya Tsujii, Derek Y. C. Chan

(8) Modeling of Pharmaceutical Unit Operations I
Monday, Apr 23, 8:00 AM
Marriott, Crystal L
Chi-Hwa Wang, Chair
Benjamin J. Glasser, Co-Chair
Carl Wassgren, Co-Chair
Sponsored by: Applications of Particle Technology for Pharmaceuticals
8:00 Paper 8a: Validation of CFD-DEM Simulation of a Continuous Tablet Coating Process — Peter Boehling, Stefan Mehr, Frederik Detobel, James Holman, Matthias Metzger, Laura Wareham, Sean McClure, Johannes G. Khinast
8:46 Paper 8c: Prediction of Pressure Filtration Performance in Systems with Pharmaceutical High Aspect Ratio Crystals — Ioannis S. Fragkopoulos, Bilal Ahmed, Claire MacLeod, Frans L. Muller

(9) Particle and Nanoparticle Functionalization for Biomedicine and Nutrition I
Monday, Apr 23, 8:00 AM
Marriott, Crystal N
Alexandra Teleki, Chair
Georgios A. Sotiriou, Co-Chair
Antonio Tricoli, Co-Chair
Sponsored by: Particle & Nanoparticle Functionalization — Yuemin Zhao, Jinfeng He, PengLv, Zhenfu Luo, Chenlong Duan, Liang Dong, Bo Zhang

(10) Particle-Based Separations Keynote I (Invited Talk)
Monday, Apr 23, 8:00 AM
Marriott, Crystal J1
Fanxing Li, Chair
A. Issangya, Co-Chair
Sponsored by: Particle-Based Separations: Fundamentals & Applications
8:00 Introductory Remarks
8:05 Paper 10a: On the Use of Structured Adsorbents in Pressure and Temperature Swing Adsorption Processes — James A. Ritter, Armin D. Ebner
8:45 Intermission

(11) Pneumatic Conveying Monday, Apr 23, 8:00 AM
Marriott, Crystal P
Haim Kalman, Chair
Sponsored by: Applications of Solids Processing Unit Operations
8:00 Paper 11a: Algorithm to Enhance Performance of Dilute Phase Pneumatic Conveying Systems — Jonathan O. Thorn
8:44 Paper 11c: Effect of Flow Aids on Calcium Carbonate Flow Rate in the Dilute Phase Pneumatic Conveying System — Johnselvakumar Lawrence, Amit K. Gautam, Jason Brantley, Matthew Haugh

(12) Student Workshop on Particle Technology: Part I Monday, Apr 23, 8:00 AM
Marriott, Crystal J2
Mayank Kashyap, Chair S. B. Reddy Karri, Co-Chair
Sponsored by: Education
8:00 Paper 12a: Student Workshop on Particle Technology I — Mayank Kashyap, Reddy Karri

(13) Plenary: Contact Charging in Granular Materials (Invited Talk)
Monday, Apr 23, 10:00 AM
Marriott, Crystal G
Ray Cocco, Chair
Sponsored by: 8th World Congress on Particle Technology Plenaries
10:00 Paper 13a: Contact Charging in Granular Materials — Heinrich M. Jaeger
TECHNICAL SESSIONS

Wednesday, Apr 25, 10:30 AM
Marriott, Crystal G
Ray Cocco, Chair
Sponsored by: 8th World Congress on Particle Technology Plenaries


(15) Applications Keynote I: Particles in Contact (Invited Talk)
Monday, Apr 23, 1:30 PM
Marriott, Crystal P
Haim Kalman, Chair
Bruce D. Hook, Co-Chair
Sponsored by: Applications of Solids Processing Unit Operations

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

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

(16) Applications of Particle Technology for Pharmaceuticals Keynote (Invited Talk)
Monday, Apr 23, 1:30 PM
Marriott, Crystal J1
Chi-Hwa Wang, Chair
Brenda Remy, Co-Chair
Sponsored by: Applications of Particle Technology for Pharmaceuticals

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

2:00 Paper 16b: Novel Technologies to Improve the Bioavailability, Content Uniformity and Manufacturing of Pharmaceuticals — Benjamin J. Glasser, Plamen I. Grigorov, Thamer Omar, Fernando J. Muzzio


(17) Characterization of Functionalized Particles and Nanoparticles I
Monday, Apr 23, 1:30 PM
Marriott, Crystal N
Dong-Yeon Koh, Chair
Karsten Wegner, Co-Chair
Sponsored by: Particle & Nanoparticle Functionalization

1:30 Paper 17a: The Silanol Content of Silica Nanoparticles (Invited) — Anastasia Sprogioanni, Inge K. Herrmann, Kerda Keeverd, Sobiris E. Pratsinis, Karsten Wegner

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

2:30 Paper 17c: Stealth Nanoparticles for Tumor Targeting: In Vivo and in Vitro Characterization (Invited) — Denisia Lizonova, Frantisek Stepanek, Vlastimil Král, Marek Kvar, Michal Pechar, Robert Pola

(18) Cohesion & Adhesion II
Monday, Apr 23, 1:30 PM
Marriott, Crystal D
Stefan Ludwig, Chair
Urs A. Peuker, Co-Chair
Sponsored by: Particle Interactions

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


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

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

2:50 Discussion

(19) Computational Approaches to Multiphase Heat, Mass Transfer & Reactive Chemistry I
Monday, Apr 23, 1:30 PM
Marriott, Crystal E
Justin Federici, Chair
Xi Gao, Co-Chair
Sponsored by: Fluidization & Multiphase Flow

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


2:14 Paper 19c: Bubbling and Slugging of Geldart Group a needles: Experiments and 3D Numerical Simulations — Florian Sabatier, Renaud Ansart, Weibin Kong, Hui Li, Gilles Flamant, Olivier Simonin


(20) Energy Conversion Process Fundamentals II
Monday, Apr 23, 1:30 PM
Marriott, Crystal K
Ning Yang, Chair
John Kuhn, Co-Chair
Sponsored by: Applications for Sustainable Energy & Environment

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

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

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

(21) Fundamentals of Fluidization II (Invited Talk)
Monday, Apr 23, 1:30 PM
Marriott, Crystal F
S. B. Reddy Karri, Chair
Raymond Lau, Co-Chair
Sponsored by: Fluidization & Multiphase Flow

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


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

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

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

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

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

(31) Education Keynote
(Invited Talk)
Monday, Apr 23, 3:30 PM
Marriott, Crystal J
Mayank Kashyap, Chair
George Klinzing, Co-Chair
Sponsored by: Education

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

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

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

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

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

(33) Measurement Techniques in Fluid-Particle Systems
Monday, Apr 23, 3:30 PM
Marriott, Crystal F
J. Ruud van Ommen, Chair
Casey LaMarche, Co-Chair
Sponsored by: Fluidization & Multiphase Flow

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

4:36 Paper 33d: An Investigation of Grian's Conveying Based on Vertical Vibration —
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TECHNICAL SESSIONS

Sponsored by: Particle-Based Separations: Fundamentals & Applications

3:30 Introductory Remarks

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

4:15 Intermission


(37) Particle Coatings and Solids Processing

Monday, Apr 23, 3:30 PM
Marriott, Crystal P
Bruce D. Hook, Co-Chair
Sponsored by: Applications of Solids Processing Unit Operations


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

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

(38) Particle Design Keynote (Invited Talks)

Monday, Apr 23, 3:30 PM
Marriott, Crystal O
Yongsheng Han, Chair
Ben Freireich, Co-Chair
Sponsored by: Particle Design

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

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

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

Monday, Apr 23, 3:30 PM
Marriott, Crystal A
Giuseppe Bonifazi, Chair
Harald Kruggel-Emden, Co-Chair
Sponsored by: Particle & Bulk Powder Characterization

3:30 Break

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

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

3:45 Paper 39c: Electrochemical Characteristic Evaluation of Lithium-Ion Battery Slurry By a Multi-Sensing Electrochemical Impedance Spectroscopy System — Masanori Kanzawa, Zhilong Wang, Tong Zhao, Masahiro Takei


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

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


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

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

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

Tuesday, Apr 24, 8:15 AM
Marriott, Crystal J
Alberto Passalacqua, Co-Chair
Madhusudhan Kodam, Co-Chair
Sponsored by: Special Topics in Particle Technology

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

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


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

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

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

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

Tuesday, Apr 24, 8:15 AM
Marriott, Crystal K
Rustom Billimoria, Chair
Benjamin Glasser, Co-Chair
Clay Sutton, Co-Chair
Jennifer Wilcox, Co-Chair
Sponsored by: Applications for Sustainable Energy & Environment

8:31 Paper 43a: Partial Regularisation of the Incompressible Mull-Rheology for Granular Flow — Thomas Barker


(44) Flow Properties of Particulate Solids I
Tuesday, Apr 24, 8:15 AM
Marriott, Crystal A
Tim Freeman, Co-Chair
Diego Barletta, Co-Chair
Sponsored by: Particle & Bulk Powder Characterization

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

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

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

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

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

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

(45) Industrial Applications of Fluidized Beds and Fluidization of Fine Particles (Invited Talk)
Tuesday, Apr 24, 8:15 AM
Marriott, Crystal F
Raj Singh, Chair
Faxing Li, Co-Chair
Sponsored by: Fluidization & Multiphase Flow


8:54 Paper 45c: Defluidization Behaviour of Industrial Reactive Powders at High Temperature — Domenico Macri¹, Stephen Sutcliffe, Paola Letteri


(46) Interface Controlled Processes I
Tuesday, Apr 24, 8:15 AM
Marriott, Crystal D
Doris Segets, Chair
Shuji Matsusaka, Co-Chair
Sponsored by: Particle Interactions

8:15 Paper 46a: Dispersion of Magnetite Nanoparticles in Brine Solutions Via Coating with Sulfonated Phenolic Resin — Yongtai Park, Heechan Cho


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

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

(47) Multi-Phase Granular Systems - Handling and Processing
Tuesday, Apr 24, 8:15 AM
Marriott, Crystal C
Joerg Theuerkauf, Chair
Chandana Ratnayake, Co-Chair
Sponsored by: Handling & Processing of Granular Systems

8:15 Break


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

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

(48) Particle and Nanoparticle Functionalization for Energy Applications I
Tuesday, Apr 24, 8:15 AM
Marriott, Crystal N
Yangchuan Xing, Chair

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


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

8:55 Break


(49) Particle Size/Shape Control
Tuesday, Apr 24, 8:15 AM
Marriott, Crystal P
Reinhard Kohlits, Chair
Sponsored by: Applications of Solids Processing Unit Operations

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

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


TECHNICAL SESSIONS

(50) Recent Advances in Dust Control and Safety
Tuesday, Apr 24, 8:15 AM
Marriott, Crystal B
Alvaro Ramirez Gomez, Chair
Eddie McGee, Co-Chair
Sponsored by: Handling & Processing of Granular Systems

8:15 Break


9:23 Paper 50d: Quantification of Lubrication and Particle Size Distribution Effects on Tensile Strength and Stiffness of Tablets — Sonia M. Razzavi, Marcial Gonzalez, Alberto Cuitino

(52) EMMS Workshop (Ticketed Event)
Tuesday, Apr 24, 9:00 AM
Marriott, Crystal Q
Wei Ge, Chair
Mayank Kashyap, Co-Chair
Wei Wang, Co-Chair
Sponsored by: Education


10:30 Break

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

12:00 Lunch Break

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

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

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

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

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

2:20 Break

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

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

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


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


4:50 Concluding Remarks

(53) Plenary: Nature-Inspired Chemical Engineering - a Pathway to Innovation in Particle Technology (Invited Talk)
Tuesday, Apr 24, 10:30 AM
Marriott, Crystal G
Ray Coco, Chair
Sponsored by: 8th World Congress on Particle Technology Plenaries

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


11:00 Paper 53d: Deposition Rate Consequences of the Formation of Multi-Sphere Cluster Aggregates in Gases — Aman Tripathi, Shivi Dixit, Vinoth Kumar, Samik Nag, Anurag Tripathi


11:20 Paper 53f: Determination of Size, Size Distribution and Refractive Index of Artificial and Biological Microparticles — Jörg Neukammer, Kathrin Smuda, Jonas Gienger, Hans Bäuml

11:30 Paper 53g: Modelling Deposition of Powders into a Confined Space — Ling Zhang, Charity Wu

11:40 Paper 53h: FlowCam Nano Provides Counts, Sizes and Images of Nano-and Microparticles: Application to a Therapeutic Protein Pumping Study — Dave Hamel, Cheng Her, Chris Sieracki, Kent Peterson, Christian Mills, John Carpenter
Particle Interactions

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

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

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


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

Handling & Processing of Granular Systems

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


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

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

Paper 137b: Characterization of Mesoscopic Structure in Cohesive Powder, Neat or Blended, By X-Ray Computed Tomography and Prediction By the Discrete Element Method — Sean McClure, Andrew Abi-Mansour, Michael Gentzler

Paper 54s: Particle & Nanoparticle Functionalization

Paper 54t: Particle Classification

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

Paper 54v: Fluidization & Multiphase Flow

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

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

Paper 54y: Macrobutter MTEditEquationSection2 Equation Chapter 1 Section 1 SEQ Mteqn \v \h " Mergeformat SEQ Mttsec \v \h " Mergeformat SEQ Mttchp \v \h " Mergeformat SEQ Mttchp \v \h " Mergeformat numerical Simulation on Fine Particle Transport Behaviour in Electrostatic Precipitators — Ming Dong, Fei Zhou, Sufen Li

Paper 54z: Lattice Boltzmann Simulations of Porous Particulate Flows — Chenggang Li, Mao Ye, Zhongmin Liu

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

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

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

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

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

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

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


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

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

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

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

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

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

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

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

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


Applications for Sustainable Energy & Environment

Paper 54ar: Immobilization of Sulfur-Oxidizing Bacterium, Thioalkalivibrio Sp. D301 on Magnetic Nanoparticles and Biodesulfurization — Jiamin Xing

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


Particle-Based Separations: Fundamentals & Applications

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

Paper 54av: Applications of Particle Technology for Pharmaceuticals

Paper 54aw: 3D Modelling of Cardiovascular Stent Implantation and Vessel Deformation Using
TECHNICAL SESSIONS

the DEM — Dr Marina Sousani, Carles Bosch Padros


Applications of Solids Processing Unit Operations

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

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

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

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

Special Topics in Particle Technology Education

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

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

Paper 54bc: Highlights of Particle Technology Teaching in Singapore — Cindy Lai Ying Lee, Edin Wei Chuan Lim, Jia Wei Chew

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

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

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

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

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

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

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

(55) Advances in Attrition, Erosion and Wear

Tuesday, Apr 24, 1:30 PM

Marriott, Crystal C

Diego Barletta, Co-Chair

Sponsored by: Handling & Processing of Granular Systems

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


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

(56) Advances in Particle Engineering for Pharmaceutical Applications II

Tuesday, Apr 24, 1:30 PM

Marriott, Crystal C

Rajesh Davé, Chair

Chi-Hwa Wang, Co-Chair

Sponsored by: Applications of Particle Technology for Pharmaceuticals


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


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

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

Tuesday, Apr 24, 1:30 PM

Marriott, Crystal C

Diego Barletta, Massimo Poletto

Sponsored by: Particle & Bulk Solids Processing Unit Operations


2:00 Paper 57b: Using a Freeman FT4 Rheometer and Electrical Capacitance Tomography to Assess Powder Blending — Michele Marigo Sr., Giuseppe Forte, Peter Clark, Edmund Steitt, Zilin Yan

2:15 Paper 57c: The Use of Modern Rheometers in Powder and Granular Media Measurements for Scientific and Industrial Purposes — Denis Schütz, Abhishek Shetty, Karja Hammart, Elke Riedl

2:30 Paper 57d: Flow Assessments of Selective Laser Sintering Powders Via Fluidized Bed Rheology on a Rotational Rheometer — Abhishek Shetty, Denis Schütz
(59) Interface Controlled Processes II
Tuesday, Apr 24, 1:30 PM
Marriott, Crystal D
Jochen Schmidt, Chair
Shuji Matsusaka, Co-Chair
Sponsored by: Particle Technology
1:30 Paper 59a: Structure of Spherical Silica Colloid Film Prepared By Electrophoretic Deposition in Pulsed Direct Current Electric Field — Yasushige Mori, Yoshiroyo Sadakami, Ken Nishimura, Katsumi Tsuichi
1:50 Paper 59b: Dynamic Wetting of Multicomponent Particle Systems — Jana Kammerhofer, Lennart Fries, Julien Dupas, Laurent Forny, Stefan Heinrich, Stefan Pažier
2:10 Paper 59c: Aspects of Wettability Heterogeneities in Floation - Investigations with Inverse Gas Chromatography and Colloidal Probe Atomic Force Microscopy — Martin Rudolph, Ben Babel, Paul Knüfer, Urs A. Peuker
2:30 Paper 59d: Surface Engineering for Designing Superhydrophobic and Superhydrophilic Particulate Solids — Deepa Dixit, Chinnmay Ghoroi

(60) Introduction to Computational Modeling
Tuesday, Apr 24, 1:30 PM
Marriott, Crystal J2
James M. Parker, Chair
Peter Blaser, Co-Chair
Olech Baran, Co-Chair
Sponsored by: Education
1:30 Introductory Remarks
1:35 Paper 60a: Introduction to Computational Modeling for Particle Technology — Mayank Kashyap
1:55 Paper 60b: Introduction to 3D Models — Mayank Kashyap
2:15 Paper 60c: Application Example #1 — Mayank Kashyap
2:35 Paper 60d: Application Example #2 — Mayank Kashyap
2:55 Concluding Remarks

(61) Liquid-Solid and Gas-Liquid-Solid Fluidized Beds
Tuesday, Apr 24, 1:30 PM
Marriott, Crystal F
Shyam Sundaram, Chair
Aaron Morris, Co-Chair
Sponsored by: Fluidization & Fluidization & Solids Mixing
1:30 Paper 61a: Experimental and Modeling Investigation of Sand Dune and Sand Bed Transition — Ramin Dabiran, Ilías Gavrielatos, Ram S. Mohan, Ovadia Shoham
1:45 Break
2:00 Paper 61c: A Meso-Scale Flow Model of Gas-Liquid-Solid Fluidized Beds with Acceleration Items — Yongli Ma
2:45 Paper 61f: Calculation of Granular Pressure By CFD-DEM Approach and Application to Stability Analysis in Solid-Liquid Fluidized Beds — Linhan GE, Roberto Moreno-Atanasio, Geoffrey M. Evans

(62) Measurement Techniques I
Tuesday, Apr 24, 1:30 PM
Marriott, Crystal E
Ted Knowlton, Chair
Jia Wei Chew, Co-Chair
Sponsored by: Fluidization & Multiphase Flow
2:00 Paper 62b: Detection of Fluidization with Real-Time Magnetic Resonance Imaging — Alexander Penn, Christopher M. Boyce, Klaus-P. Pruessmann, Christoph R. Müller
2:40 Paper 62d: Stereoscopic PIV Study on Swirl Phenomena in Uniflow Cyclones — Martin Pillei, Tobias Koffler, Michael Kramner

(63) Particle and Nanoparticle Functionalization Keynote (Invited Talk)
Tuesday, Apr 24, 1:30 PM
Marriott, Crystal J1
Alan W. Weimer, Chair
Sponsored by: Particle Technology and Nanoparticle Functionalization
1:30 Paper 63a: Atomic Layer Deposition for the Synthesis of Nanostructured Catalysts — Jeffrey Elam

(64) Recent Developments in the Characterization of Pharmaceutical Materials II
Tuesday, Apr 24, 1:30 PM
Marriott, Crystal L
Chih-Hwa Wang, Chair
Satoru Watano, Co-Chair
Mario Hubert, Co-Chair
Sponsored by: Applications of Particle Technology for Pharmaceuticals
1:30 Paper 64a: Relative Importance of Cohesion and Internal Friction in Flowability of Pharmaceutical Powder — Lap Yin (Henry) Leung, Chen Mao
2:16 Paper 64c: Characterization of Paracetamol Granules Formed By Binder Dropping — Sheena Reeves, Adetutu Martins

(65) Segregation and Mixing - Modeling, Simulations and Applications I
Tuesday, Apr 24, 1:30 PM
Marriott, Crystal B
Stefan Luding, Chair
Francisco J. Cabrejos, Co-Chair
Sponsored by: Handling & Granular Systems
1:30 Paper 65a: Applying Particle-Size Segregation Theory to the Erosion-Deposition Dynamics of Granular Avalanches — Andrew Edwards, Nico Gray
1:50 Paper 65b: Radial Segregation of Binary-Sized Mixture of Ellipsoids in a Rotating Drum — Siyuan He, Jieqing Gan, David Pinson, Zongyan Zhou
2:10 Paper 65c: Analysis of Mixing Dynamics of Powders in a Nauta Mixer Using DEM Simulation — Nathen Loaist, Xavier Bednarek, Sylvain Martin, Ndiaye Abidatou, Olivier Bonnefoy
2:30 Paper 65d: Continuum Analysis of DEM Simulations of Mixing Processes — Álvaro Janda, Carlos Labra
### Technical Sessions

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>2:50</td>
<td>Discussion</td>
<td></td>
</tr>
<tr>
<td>(66)</td>
<td>Separations with Surface Active Particles</td>
<td></td>
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<tr>
<td>Tuesday, Apr 24, 1:30 PM</td>
<td>Marriott, Crystal N, Susanne Wolff, Co-Chair, Fangxing Li, Co-Chair</td>
<td>Co-Chair:Applications for Sustainable Energy &amp; Environment Separations (Invited Talks)</td>
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<tr>
<td>1:30</td>
<td>Introductory Remarks</td>
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<tr>
<td>1:35</td>
<td>Paper 66a: Second Dose during the Breakage Occurred in Initial Flocculation Phase: Does It Work Positively? — Zhaoyang Su Sc, Xing Li Sr, Yanling Yang Sr.</td>
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<td>2:15</td>
<td>Paper 66c: Effect of Oil Filtration on Oil-Water Dispersion Characterization — Ramin Dabarian, Cristian Nunez, Ilias Gavrielatos, Ram S. Mohan, Ovadia Shoham</td>
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<tr>
<td>2:35</td>
<td>Concluding Remarks</td>
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</tr>
<tr>
<td>(67)</td>
<td>Applications for Sustainable Energy &amp; Environment Support (Invite Talks)</td>
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<tr>
<td>Tuesday, Apr 24, 1:30 PM</td>
<td>Marriott, Crystal K, Eric B. Shen, Chair, Ah-Hyung Alissa Park, Co-Chair</td>
<td>Co-Chair:Applications for Sustainable Energy &amp; Environment Separations (Invited Talks)</td>
</tr>
<tr>
<td>1:30</td>
<td>Paper 67a: Creating a Pathway to Sustainability: The Critical Contribution of Particle Technology Research — Hamid Arastoopour</td>
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<td>2:15</td>
<td>Paper 67b: Energy Outlook, A View to 2040 — Rustom Billimoria</td>
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<td>3:00</td>
<td>Paper 67c: Chemical Looping Combustion, Gasification and Reforming — Particle Technology Perspectives — L.-S. Fan</td>
<td></td>
</tr>
<tr>
<td>(68)</td>
<td>Advances in Particle Engineering for Pharmaceutical Applications III</td>
<td></td>
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<tr>
<td>Tuesday, Apr 24, 3:30 PM</td>
<td>Marriott, Crystal M, Chi-Hwa Wang, Chair, Ecevit Bilgili, Co-Chair</td>
<td>Co-Chair:Applications for Pharmaceutical Separations</td>
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<td>3:30</td>
<td>Paper 68a: Enabling Direct Compaction at High Drug Loading Via Dry Coating of APIs: Towards a Predictive Framework — Rajesh Davé, Kuriakose Kunath</td>
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<tr>
<td>4:20</td>
<td>Paper 68c: The Role of Surface Energy on Developing Engineered Excipients during Dry Coating Process — Liang Chen, Rajesh Davé</td>
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<tr>
<td>4:00</td>
<td>Paper 69a: Particle Characterization and Imaging of Gas-Solid Systems Using Electrical Capacitance Tomography — Gussai Marashdeh, Benjamin Stralton, Andrew Tong, Liang-Shih Fan</td>
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<tr>
<td>4:09</td>
<td>Paper 69b: Generating Macroscopic Quantities of Particle-Fluids of Coarse Particles By an Averaging Method: Selection of Sample Sizes and Test of Solid Pressure Correlation — Qinfu Hou</td>
<td></td>
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<tr>
<td>4:26</td>
<td>Paper 70d: Structured Flow in Gas-Solid Fluidized Beds: Particle Clustering and Bubble Self-Organisation — Victor Francia, Kaixiao Wu, Marc-Olivier Coppens</td>
<td></td>
</tr>
<tr>
<td>(71)</td>
<td>Interface Controlled Processes III</td>
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<tr>
<td>Tuesday, Apr 24, 3:30 PM</td>
<td>Marriott, Crystal D, Jochen Schmidt, Chair, Shuji Matsusaka, Co-Chair</td>
<td>Co-Chair:Applications for Particle Separations (Invited Talks)</td>
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<tr>
<td>3:30</td>
<td>Paper 71a: The Influence of Nanobubbles on the Interaction Forces between Alumina Particles and Ceramic Foam Filters in Water — Lisa Dilscheitlin, Urs A. Peuker</td>
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<td>4:10</td>
<td>Paper 71c: Analysis and Control of Adhesion Behavior of Sewage Sludge Combustion Ashes at High Temperature — Jugal Gao, Miki Matsushita, Hidehito Kamiya, Mayumi Tsukada</td>
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<td>4:30</td>
<td>Paper 71d: Mixed Layer Formation in a Blast Furnace and Its Effect on the Performance — Dianyu E, Qinfu Hou, Aibing Yu</td>
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<tr>
<td>(72)</td>
<td>Measurement Techniques II</td>
<td></td>
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<tr>
<td>Tuesday, Apr 24, 3:30 PM</td>
<td>Marriott, Crystal E, Ted Knowlton, Chair, Poupak Mehrani, Co-Chair</td>
<td>Co-Chair:Applications for Fluidization &amp; Multiphase Flow (Invited Talks)</td>
</tr>
</tbody>
</table>
4:00 Paper 72b: Material Distribution of Gas–Solid Fluidized Beds Measured By Electrical Capacitance Tomography – a Big-Data Perspective — Mao Ye, Qiang Guo, Shuanghe Meng, Wu Qiang Yang, Zhongmin Liu


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

4:00 Paper 74: Particle and Nanoparticle Functionalization for Energy Applications II Tuesday, Apr 24, 3:30 PM
Marriott, Crystal N
Yangchuan Xing, Chair
Xinhua Liang, Co-Chair
Karen J. Buechler, Co-Chair
Sponsored by: Particle & Nanoparticle Functionalization

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

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


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

4:00 Paper 78a: Numerical Study of Vibration Induced Segregation with Ellipsoids — Dizhe Zhang, David Pinson, Zongyan Zhou

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

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

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

4:50 Discussion

(78) Segregation and Mixing - Modeling, Simulations and Applications II
Tuesday, Apr 24, 3:30 PM
Marriott, Crystal B
Stefan Ludwig, Chair
Francisco J. Cabrejos, Co-Chair
Sponsored by: Handling & Processing of Granular Systems

3:30 Paper 76a: Investigation into the Effect of Process and Operational Parameters on the Spray Coating of Detergent Powders through Contact Spreading in Tumbling Drums — Joshua Green, Kate Pitt, Norzaida Yusof, Andrew Campbell, Hossein Ahmadian, Prashant Gupta, Simon Greener, Jiwsheng Fu, Clare Martin, Rachel Smith

4:42 Paper 76b: Alginic Encapsulation As Drug Targeting Depot System — Jan Tomas, Onřej Navrátil, Ales Zadrazil, Frantisek Stepanek

(75) Recent Developments in the Characterization of Pharmaceutical Materials III Tuesday, Apr 24, 3:30 PM
Marriott, Crystal L
Chi-Hwa Wang, Chair
Satoru Watano, Co-Chair
Mario Hubert, Co-Chair
Sponsored by: Applications of Particle Technology for Pharmaceuticals

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

3:48 Paper 77b: Multi-Sensor Measurements of Quantitative Particle Size and Shape Information in Crystal Sturries — Carla Ferreira, Bilal Ahmed, Javier Cardona, Okpeafoh Agimeleen, Jan Sekfik, Y-Chieh Chen

4:06 Paper 77c: Particle Design of Spray Dried Fat Powders — Impact of Lipid Distribution within Particles on Oxidative Stability — Annaika Linke, Heike Telchmann, Jochen Weiss, Reinhard Kohlus

4:24 Paper 77d: Alginic Encapsulation As Drug Targeting Depot System — Jan Tomas, Onřej Navrátil, Ales Zadrazil, Frantisek Stepanek

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

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

4:50 Discussion

(77) Recent Developments in the Characterization of Pharmaceutical Materials III Tuesday, Apr 24, 3:30 PM
Marriott, Crystal L
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Mario Hubert, Co-Chair
Sponsored by: Applications of Particle Technology for Pharmaceuticals

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

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

4:50 Discussion

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

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

4:00 Paper 76b: Production of Functionalized Powders Using Effervescent Spray Drying — Socrates Foschini, Erich Windhab
(81) Advances in Particle Engineering for Pharmaceutical Applications IV
Wednesday, Apr 25, 8:15 AM
Marriott, Crystal M
Chi-Hwa Wang, Chair
eEcvet Bilgii, Co-Chair
Sponsored by: Applications of Particle Technology for Pharmaceuticals

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

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

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


(80) Carbon Capture, Utilization, and Storage and Low-Carbon Energy Conversion II
Tuesday, Apr 24, 4:00 PM
Marriott, Crystal K
Clay Sutton, Chair
Rustom Billimoria, Co-Chair
Benjamin Glasser, Co-Chair
Jennifer Wilcox, Co-Chair
Sponsored by: Applications for Sustainable Energy & Environment

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

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

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

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


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

9:00 Paper 82c: Interaction Forces in Relation to Agglomerate Size of Hydrophobic Particles — Paul Knüpfel, Urs A. Peuker


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

(83) Computational Aspects of Fundamentals of Fluidization (Invited Talk)
Wednesday, Apr 25, 8:15 AM
Marriott, Crystal F
Madhusudhan Kodam, Chair
Sponsored by: Fluidization & Multiphase Flow

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


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

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

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

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

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

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

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

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


8:37 Paper 86e: Modeling and Simulation of Bulk Solids and Granular Systems Wednesday, Apr 25, 8:15 AM Marriott, Crystal B Subhah Thakur, Chair Pablo Garcia Trilanes, Co-Chair Sponsored by: Handling & Processing of Granular Systems


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

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

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

(88) Novel and Non-Conventional Reactors and Multiphase Flow Systems I Wednesday, Apr 25, 8:15 AM Marriott, Crystal P Carl Wassgren, Chair Joerg Theuerkauf, Co-Chair Sponsored by: Applications of Solids Processing Unit Operations

8:15 Paper 88a: Use of Process Analytical Technology (PAT) for Monitoring and Optimizing Powder Mixing Processes — Volker Kehlenbeck

8:37 Paper 88b: Synthesis of Surface Functionalized Adsorbents for Adsorption of Metal Ions and Organic Pollutants By Atomic Layer Deposition (Invited) — Xiaofeng Wang, Xinhuo Liang

8:45 Paper 88c: Effect of Surface Modification on Filtration Performance of Gas-Liquid Coalescing Filters (Invited) — Feng Chen, Zongli Ji, Qiangqiang Qi

<table>
<thead>
<tr>
<th>TIME</th>
<th>SESSION</th>
<th>SPEAKERS/PROJECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:15 Introductory Remarks</td>
<td></td>
<td></td>
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<tr>
<td>8:20 Paper 92a:</td>
<td>Mixed Oxide Particles As Oxygen</td>
<td>— Mao Cheng</td>
</tr>
<tr>
<td></td>
<td>Separation Agents for Methane</td>
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<td></td>
<td>Partial Oxidation and Water/Carbon Dioxide Splitting</td>
<td>— Fanxing Li</td>
</tr>
<tr>
<td>8:45 Intermission</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Coal with Annular Carbon Stripper</td>
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<tr>
<td>9:15 Paper 92c:</td>
<td>Greener Ethylene Production Via</td>
<td>— Ruihuan Ge</td>
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<tr>
<td></td>
<td>Chemical Looping Oxidative</td>
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<td>Dehydrogenation — Vasudev</td>
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<tr>
<td>9:40 Concluding Remarks</td>
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<tr>
<td>8:15 Paper 93a:</td>
<td>Enhancing Particle Technology</td>
<td>— Priyanka D. M. Moudgil</td>
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<tr>
<td></td>
<td>Education through Art</td>
<td></td>
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<tr>
<td>8:45 Paper 93b:</td>
<td>Putting Particles</td>
<td>— Christopher Gump, Christopher J. Bartel, Maila Kodas, Tim Freeman</td>
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<tr>
<td></td>
<td>First in Student Education- a</td>
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<td>Critical Review Why Particle</td>
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<td>Graduate Chemical Engineering</td>
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<td>Programmes — Pablo Garcia</td>
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<td>Triñanes, Stefan Zigan</td>
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<td>9:15 Paper 93c:</td>
<td>Teaching Particle Technology to</td>
<td>— Ruihuan Ge</td>
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<td>Engineering Students</td>
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<td>— Marvin Meineche, Katharina</td>
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<td>Zilles, Marcus Petermann, Martin</td>
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<td>Rhodes, Raffaella Ocone</td>
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<tr>
<td>8:15 Paper 94a:</td>
<td>Mesoscience - Opening a New</td>
<td>— Jinghai Li</td>
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<tr>
<td></td>
<td>Paradigm of Particle Technology</td>
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<tr>
<td>9:15 Paper 94b:</td>
<td>Opening a New Paradigm of Particle Technology (Invited Talk)</td>
<td>— Jinghai Li, Bo Yang, Jinghao Li</td>
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<tr>
<td></td>
<td>— paper 94b</td>
<td></td>
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<tr>
<td>9:15 Paper 94c:</td>
<td>Plenary: Mesoscience</td>
<td>— Wolfgang Peukert, Martin Muttagh, Navin Venugopal, Tim Freeman</td>
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<td>- Opening a New Paradigm of</td>
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<td></td>
<td>Particle Technology</td>
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<td></td>
<td>Technology Student Poster Session</td>
<td>Technology — Maximilian A. Dechet, Juan S. Gómez Bonilla, Jochen Schmidt,</td>
</tr>
<tr>
<td>9:15 Paper 95a:</td>
<td>Particle Measurement in High</td>
<td>Wolfgang Peukert, Martin Muttagh, Navin Venugopal, Tim Freeman</td>
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<tr>
<td></td>
<td>Temperature Gas Based on Mie</td>
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<td>Scattering — Lifeng LU Sr.,</td>
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<td>Xiuxin Wu, Zhongli Ji, Mingxing</td>
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<td>WANG Sr.</td>
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<tr>
<td>9:15 Paper 95b:</td>
<td>Experimental Investigation of</td>
<td>— Wael Ebrahim, Andrew Bayly</td>
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<tr>
<td></td>
<td>Single Droplet Drying Above</td>
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<td>Boiling Point — Wael Ebrahim,</td>
<td></td>
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<td></td>
<td>Andrew Bayly</td>
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<tr>
<td>9:15 Paper 95c:</td>
<td>Characterising Powder Flow in</td>
<td>— Martin Muttagh, Navin Venugopal, Tim Freeman</td>
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<tr>
<td></td>
<td>Dynamic Processes — Marvellous J.</td>
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<tr>
<td></td>
<td>Khalsa, Colin Hare, Chuan-Yu Wu</td>
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<td></td>
<td>— Martin Muttagh, Navin Venugopal</td>
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<td>— Tim Freeman</td>
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<tr>
<td>9:15 Paper 95d:</td>
<td>Testing the Flowability of</td>
<td>— Martin Muttagh, Navin Venugopal, Tim Freeman</td>
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<tr>
<td></td>
<td>Fibrous and Woody Biomass for</td>
<td></td>
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<td>Various Particle Size Distributions and Moisture Levels — Spandana Vajrana,</td>
<td>— Martin Muttagh, Navin Venugopal, Tim Freeman</td>
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<tr>
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<td>— Heather N. Emady</td>
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<tr>
<td>9:15 Paper 95e:</td>
<td>Impact of Non-Spherical</td>
<td>— Martin Muttagh, Navin Venugopal, Tim Freeman</td>
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<tr>
<td></td>
<td>Projectiles on Granular Media</td>
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<td>— Spandana Vajrana, Hosain</td>
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<td>Bagheri, Hamid Marvi, Heathen N.</td>
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<tr>
<td>9:15 Paper 95f:</td>
<td>Computational and Experimental</td>
<td>— Martin Muttagh, Navin Venugopal, Tim Freeman</td>
</tr>
<tr>
<td></td>
<td>Shear Cell Study with Rigid</td>
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<td></td>
<td>Cylindrical Particles — Liliana</td>
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<td>Bello, Kevin E. Buettner, Yu Guo,</td>
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<td>Virginia Lane, Haim Kalman,</td>
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<td>Jennifer Sinclair Curtis</td>
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<tr>
<td>9:15 Paper 95g:</td>
<td>Influence of Alumina Support</td>
<td>— Martin Muttagh, Navin Venugopal, Tim Freeman</td>
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<tr>
<td></td>
<td>Crystallinity on ALD-Synthesized</td>
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<td>Cobalt Catalysts for Fischer-</td>
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<td>Tropsch Synthesis — Jacob M.</td>
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<td>Clary, Staci A. Van Norman, Dung</td>
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<td>Su, Eric A. Stach, John L.</td>
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<td>Falconer, Charles B. Musgrave,</td>
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<td>Alan W. Weimer</td>
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<tr>
<td>9:15 Paper 95h:</td>
<td>Defluidization Behaviour of</td>
<td>— Jinghai Li</td>
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<tr>
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<td>Industrial Reactive Powders at</td>
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<td>High Temperature — Domenico</td>
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<td>Macri, Paola Lettieri</td>
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<tr>
<td>9:15 Paper 95i:</td>
<td>Manufacturing and Characterization of Spherical Blend PBT-PC Particles for</td>
<td>— Jinghai Li</td>
</tr>
<tr>
<td></td>
<td>Additive Manufacturing —</td>
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<td>Maximilian A. Dechet, Juan S.</td>
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<td>Gómez Bonilla, Jochen Schmidt,</td>
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<td>Wolfgang Peukert</td>
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<tr>
<td>9:15 Paper 95j:</td>
<td>Fluidization &amp; Multiphase Flow</td>
<td>— Jinghai Li</td>
</tr>
<tr>
<td></td>
<td>— Yonghui Cao, Gen Zhao, Cao</td>
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<td>Guo, Xue Liu, Zuo Chen, Qing</td>
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<td>Liang, Bo Lv Sr.</td>
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<tr>
<td>9:15 Paper 95k:</td>
<td>Fluidized Bed Layer in the Gas</td>
<td>— Jinghai Li</td>
</tr>
<tr>
<td></td>
<td>Solid Fluidized Bed</td>
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<tr>
<td>9:15 Paper 95l:</td>
<td>CFD-DEM Simulation of the</td>
<td>— Jinghai Li</td>
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<td></td>
<td>Fluidization of Non-Spherical</td>
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<td>Particles in Fluidized Bed —</td>
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<td></td>
<td>Huoqing Ma, Y ongzhao Zhao</td>
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<tr>
<td>9:15 Paper 95m:</td>
<td>CFD and DEM Simulation of the</td>
<td>— Jinghai Li</td>
</tr>
<tr>
<td></td>
<td>Cold Spray Process for Surface</td>
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<td>Coating with Fine Particles —</td>
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<td>Paul Breuning, Fabian Krull,</td>
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<td>Sergiy Antonyuk</td>
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<td></td>
<td>— Jungui Wang, Siwu Wang, Ge Wei</td>
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<tr>
<td>9:15 Paper 95o:</td>
<td>Atomically Deposited Sintering</td>
<td>— Jinghai Li</td>
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<tr>
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<td>Aids: Assessing the Effects of</td>
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<td>Alumina Particle ALD on the</td>
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<td>Sintering and Performance</td>
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<td>of SOFC Electrolytes and Dental</td>
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<td>Ceramics — Rebecca O’Toole,</td>
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<td>Christopher J. Bartel, Maila</td>
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<td>Kodas, Alexa Horrell, Sandrine</td>
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<td>Ricolte, Neal P. Sullivan, Austin</td>
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<td>9:15 Paper 95p:</td>
<td>Handling &amp; Processing of</td>
<td>— Jinghai Li</td>
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<tr>
<td></td>
<td>Granular Systems — Fabian</td>
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<td>Krull, Sergiy Antonyuk</td>
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<tr>
<td>9:15 Paper 95q:</td>
<td>Selective Hydrogenation of</td>
<td>— Jinghai Li</td>
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<tr>
<td></td>
<td>Citral over Supported Pt Catalysts on Various Substrates — Xiaofeng Wang,</td>
<td></td>
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<td>Xinhua Li</td>
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<tr>
<td>9:15 Paper 95r:</td>
<td>Numerical Simulation of Particle</td>
<td>— Jinghai Li</td>
</tr>
<tr>
<td></td>
<td>Classification in a Classifier</td>
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<td>Based on Coanda Effect — Donghee Kim, Soon-Min Jeong, Junyoung Park, Yoonjung</td>
<td></td>
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<td>Seo, Bo Lv Sr., Zhenuo Luo</td>
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<tr>
<td>9:15 Paper 95s:</td>
<td>Numerical Simulation of the</td>
<td>— Jinghai Li</td>
</tr>
<tr>
<td></td>
<td>Secondary Air Distribution Layer in the Gas Solid Fluidized Bed Based on Flunt Software</td>
<td></td>
</tr>
<tr>
<td>9:15 Paper 95t:</td>
<td>CFD-DEM Simulation of the</td>
<td>— Jinghai Li</td>
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<td></td>
<td>Fluidization of Non-Spherical</td>
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<td>Particles in Fluidized Bed —</td>
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<tr>
<td>9:15 Paper 95u:</td>
<td>Simulation of the Cold Spray</td>
<td>— Jinghai Li</td>
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<tr>
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<td>Process for Surface Coating</td>
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<td>with Fine Particles — Paul</td>
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<td>Antonyuk</td>
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<td>9:15 Paper 95v:</td>
<td>Two-Fluid Validation of</td>
<td>— Jinghai Li</td>
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<td>Constitutive Models for the</td>
<td></td>
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<td>Simulation of Cylindrical Particles — Kevin E. Buettner, Yu Guo, Soffane</td>
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<td>Benyathia, Jennifer Sinclair</td>
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<td>Curtis</td>
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<td>9:15 Paper 95w:</td>
<td>The Comparsion of Coarse</td>
<td>— Jinghai Li</td>
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<td>Grained CFD-DEM for Simulating</td>
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<td>Bed” Requires Immediate Action —</td>
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<td>Yong Zhang, Junwu Wang, Ge Wei</td>
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</tbody>
</table>
Applications of In Situ Drug Amorphisation by Microwave Irradiation Stabilized by Mesoporous Silica — Jakub Muzik, David Ziza, Marek Sohtys, Denisa Ligonova, Aleš Zdražil, Pavel Kovačík, František Štepánek

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

Paper 95ad: Correlation Study between Liquid Penetration and Mechanical Properties of Pharmaceutical Tablets — Jan Tomas, Jakub Dvorak, Marek Schongut, František Štepanek, Josef Beranek, Ondrej Dammr

Paper 95ae: In Situ Drug Amorphisation by Microwave Irradiation Stabilized by Mesoporous Silica — Jakub Muzik, David Ziza, Marek Sohtys, Denisa Ligonova, Aleš Zdražil, Pavel Kovačík, František Štepánek

Paper 95af: Use of Advanced Imaging Techniques in Tablet Disintegration Study — Jakub Dvorak, Denisa Lizonova, Marek Schongut, František Štepanek, Josef Beranek

Paper 95ag: Manufacturing of Personalised Medicines by API Printing on Porous Tablets — Sarah Akhlasová, Marek Sohtys, Pavel Kovačík, Aleš Zdražil, František Štepáněk

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

Paper 95ai: Treatment of Cystinosis through Vitamin E Modified Silicone Hydrogel — Philip Dixon

Paper 95aj: Systems Integration for Dry Granulation Based Continuous Pharmaceutical Tabletting — Sudarshan Ganesh, idyastuti Mariana Moreno, Yassavi Bommireddy, Qinglin Su, Marcial Gonzalez, Zoltan Nagy, Gintaras Reklaitis

Applications of Solids Processing Unit Operations

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

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

(96) Advances in Particle Engineering for Pharmaceutical Applications V Wednesday, Apr 25, 1:30 PM

Marriott, Crystal M

Chi-Hwa Wang, Chair

Ecevit Bilgili, Co-Chair

Sponsored by: Applications of Particle Technology for Pharmaceuticals

1:30 Paper 97a: Preparation of Glucan Microparticulates with Curcumin for Treatment of Idiopathic Inflammation Diseases — Petra Šalamünová, Jaroslav Hanuš, František Štepáněk, Gabriela Ruphuy Chan, Ivan Saliér, Zuzana Pavlová, Dominik Rotrek, Jan Hošek


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

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

(98) Computational Approaches in Fluidization Fundamentals I (Invited Talk) Wednesday, Apr 25, 1:30 PM

Marriott, Crystal F

Clay Sutton, Chair

Sponsored by: Fluidization & Multiphase Flow

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

2:00 Paper 54ac: A Fundamental Framework for Simulating Large-Scale Particulate Systems Using the Direct Simulation Monte Carlo Method — Aaron Morris

2:20 Paper 98b: Comparison of CFD Models in Predicting the Fluidization Behavior of Geldart B Particles — Benjamin Amblard, Stephane Bertholin, Ann Forret, Thierry Gauthier, Sina Tebianian
TECHNICAL SESSIONS


(99) Discrete Element Modeling of Cohesive Materials
Wednesday, Apr 25, 1:30 PM
Marriott, Crystal B
Subhash Thakur, Chair
Pablo Garcia Trifianes, Co-Chair
Sponsored by: Handling & Processing of Granular Systems
— Raj Mukherjee, Bodhisattwa Chaudhuri

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

2:14 Paper 101a: Experimental and Simulation Investigation on Arching Behaviour of Two Biomass Materials from a Wedge Shape Hopper — Hamid Sahel Kahrizsangi, Daniele Sofia, Diego Barletta, Massimo Poletto, Sylvia Larsson

1:52 Paper 99a: Discrete Element Modeling to Predict Triboelectrification in Pharmaceutical Powders — Timothy Raymond, Co-Chair

1:30 Paper 99: Case Study Modules in Particle Technology — Timothy M. Raymond

(101) Industrial Applications of Solids Processing
Wednesday, Apr 25, 1:30 PM
Marriott, Crystal C
Kerry Johanson, Chair
Hans Schneider, Co-Chair
Sponsored by: Handling & Processing of Granular Systems

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


2:36 Paper 101c: Sensitive Powders during Die Filling with Air-Generalized Approach for Predicting the Flowability of Fine Powders — Joesry El Charley Wu, Justin Weber

(103) Mixing Segregation Principles
Wednesday, Apr 25, 1:30 PM
Marriott, Crystal P
Richard M. Lueptow, Chair
Yi Fan, Co-Chair
Sponsored by: Applications of Solids Processing Unit Operations

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

1:52 Paper 54a: Segregation during Die Filling with Air-Sensitive Powders — Joersy El Hebiesh, Qing Cai, Charley Wu

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

Wednesday, Apr 25, 1:30 PM
Marriott, Crystal A
Ugar Tuzun, Chair
Alvaro Ramirez Gomez, Co-Chair
Sponsored by: Particle & Bulk Powder Characterization

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


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

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

2:36 Paper 104e: Accelerated Heat Transfer Simulations Using Coupled CFD and DEM — Marina Sousani Dr, Andrew M. Hobs, Adam Anderson Dr, Richard Wood Dr


(105) Novel and Non-Conventional Reactors and Multiphase Flow Systems II
Wednesday, Apr 25, 1:30 PM
Marriott, Crystal E
L.S. Fan, Chair
Andrew Tong, Co-Chair
Sponsored by: Fluidization & Multiphase Flow

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

(113) Finite Element Modeling of Granular Materials
Wednesday, Apr 25, 3:30 PM
Marriott, Crystal B
Subhash Thakur, Chair
Pablo Garcia Triáñez, Co-Chair
Sponsored by: Handling & Processing of Granular Systems

3:30 Paper 113a: 2D Multi-Particle Finite Element Modelling on the Cold Isostatic Pressing of Al Powder — Zixiong An

3:52 Paper 113b: A Comparison of Finite Element Constitutive Models for Particulate Flow — Kunal S. Pardikar, Carl R. Wassgren, Tyler L. Westover

4:14 Paper 113c: Simulating Bilayer Tablet Compaction: Effect of Compaction Parameters and Material Properties on Tablet Attributes — Shrikant Swaminathan, Hector Guzman


(114) Industrial and Engineering Applications in Granular Systems
Wednesday, Apr 25, 3:30 PM
Marriott, Crystal C
Lyn Bates, Chair
Jin Ooi, Co-Chair

Sponsored by: Handling & Processing of Granular Systems

3:30 Paper 114a: The Importance of the Residence Time Distribution for Designing Solids Handling Process Plants — Hans Schneider


4:36 Paper 114d: Granulation of Soft Porous Crystal Particles — Shuji Ohsaki, Yuka Nakahara, Hideya Nakamura, Satoru Watanabe

(115) Interparticle Forces II
Wednesday, Apr 25, 3:30 PM
Marriott, Crystal D
Colin Haro, Chair
Naoyuki Ishida, Co-Chair
Sponsored by: Particle Interactions


3:52 Paper 115b: Two Particle Type Blending for the Rheological Modification of Yield Stress Sediments — Shafeeq Ahmed, Juliette Behra, Nicole Hongow, Timothy N. Hunter, David Harbotile

4:14 Paper 115c: Collisonal Dissipation Rate of Flexible Rods Measured Using Driven and Non-Driven DEM Simulations — Kevin E. Buettnern, Yu Guo, Liliana Bello, Jennifer Sinclair Curtis


(116) Mixing Segregation Simulations: Industrial Application
Wednesday, Apr 25, 3:30 PM
Marriott, Crystal P
Yi Fan, Chair
Richard M. Luetpont, Co-Chair
Sponsored by: Applications of Solids Processing Unit Operations

3:30 Paper 116a: Continuum Modeling of Granular Segregation in Hopper Discharge Flows — Hongyi Xiao, Yi Fan, Karl Jacob


4:36 Paper 116d: Spatiotemporal Distribution of Granular Kinetic Energy in Rotating Tumbler with Axial Segregation — Yangzi Zhao

(117) Novel and Non-Conventional Reactors and Multiphase Flow Systems III
Wednesday, Apr 25, 3:30 PM
Marriott, Crystal E
L.S. Fan, Chair
Andrew Tong, Co-Chair
Sponsored by: Fluidization & Multiphase Flow

3:30 Paper 117a: Hydrogen Transport through Consolidated Particulate Suspensions of Nuclear Corrosion Products; Insights from X-Ray Tomography — Michael Johnson, Simon Biggs, Mike Fairweather, Jeffrey Peakall, Xiaoqiong Jia, David Harbotile, Timothy N. Hunter


4:20 Paper 117c: Experimental Study on Flow Characterization in a Rectangular Spouted Bed By Image Processing — Jingsi Yang, Ronald W. Brault, Steven Rowan, Justin Weber

4:40 Paper 117d: Atomic Layer Deposition and Other Applications of the Littleford Plow Mixer As A Mechanically Fluidized Bed — Michael A. Smith

(118) Particle and Nanoparticle Functionalization for Reaction and Separation Processing II
Wednesday, Apr 25, 3:30 PM
Marriott, Crystal N
Satish Nune, Chair
Karsten Nune, Co-Chair
Sponsored by: Particle & Nanoparticle Functionalization

3:30 Paper 118a: Fabrication of Highly-Filled Composites By Spouted Bed Coating and Study of the Influence of Particle Shape on Mechanical Properties of the Materials (Invited) — Eduard Eichner, Maksym Dosta, Stefan Heinrich, Gerald A. Schneider

4:00 Paper 118b: Sedimentation and Magnetophoretic Velocity of Plain and Functionalized Magnetic Nanoparticles By In Situ Visualization of Separation Behavior in Superposed Gravity and Magnetic Fields (Invited) — Dietmar Lerche, Markus Wolff, Torsten Detloff, Olga Mykhaylyk

4:30 Paper 118c: Synthesis of Cerium Oxide Nanoparticles Under Reservoir-like Conditions (Invited) — Shahid Pervaiz, Gulham Raza, Muhammad Ajjad, Dongsheng Wen, Xiaojun Lai, Xiaojun Lai

(119) Renewable Energy, Bioenergy and Energy Storage III
Wednesday, Apr 25, 3:30 PM
Marriott, Crystal K
Zheng Chen, Chair
Sponsored by: Applications for Sustainable Energy & Environment

4:00 Paper 119b: Synchrotron x-Ray Tomography of Suspension Electrodes for Energy Storage and Water Desalination Applications — Kelsey Hatzell, Marm Dixit, Daniel Moreno, Marta Hatzell

4:30 Paper 119c: Enhanced Performance of Li-Rich Layered Cathode By CeO2 Atomic Layer Deposition — Yan Gao, Xinhua Liang

(120) Sorbents and Sorbent-Based Separation Processes

Wednesday, Apr 25, 3:30 PM

Marriott, Crystal M
Christoph R. Müller, Chair
Andrew Tong, Co-Chair
Sponsored by: Particle-Based Separations: Fundamentals & Applications

3:30 Introductory Remarks

3:35 Paper 120a: Scaling Down a Purge Bin: a Multiscale Model-Centric Focus on Process Fundamentals — Justin Federici, Bing Du, Sarah Feicht, Steven Haynie, Dave Sandell


4:17 Paper 120c: CO2 Separation from Combustion Flue Gas Using Carbide Slag As CO2 Carrier — Songong Li, Wenli Song


(121) Troubleshooting in Particle Technology

Wednesday, Apr 25, 3:30 PM

Marriott, Crystal J2
Shrikant Dhodapkar, Chair
Francisco J. Cabrejos, Co-Chair
Sponsored by: Education

3:30 Paper 121a: Using Computational Tools to Solve Industrial Problems — Rahul Bharadwaj

3:48 Paper 121b: Troubleshooting in Fluidized Bed Processes — Ted Knowlton

4:06 Paper 121c: Troubleshooting in the Pharmaceutical Industry — James Michaels

4:24 Paper 121d: Troubleshooting in Silos, Bins and Hoppers — David A. Craig

(122) Characterization of Nanoparticles I

Thursday, Apr 26, 8:15 AM

Marriott, Crystal A
Martin Morgeneier, Co-Chair
Sponsored by: Particle & Bulk Powder Characterization


8:30 Paper 122b: Continuous Synthesis and in Situ SAXS Analysis of Silica Nanoparticles in Liquid Phase — Manuel Meier, Julian Ungerer, Hermann Nirschl


9:00 Paper 122d: Time-Resolved Characterization of Customized Aluminum-Doped Zinc Oxide Nanocrystals By Means of Small-Angle X-Ray Scattering — Julian Ungerer, Manuel Meier, Hermann Nirschl

9:15 Paper 122e: Multiple Particle Size Distribution Characterization Techniques Applied to Certified Standards in the Nanoparticle Size Region — Alan Rawle, Joerg Bolze


(123) Computational Methods for Industrial Fluidization Applications & Process Scale-Up I (Invited Talk)

Thursday, Apr 26, 8:15 AM

Marriott, Crystal F
Ronald W. Braeutig, Chair
Azita Ahmadzadeh, Co-Chair
Sponsored by: Fluidization & Multiphase Flow


9:05 Paper 123c: DEM Simulation of Cylinders and Capsules in a Fluidized Bed — Oleh Baran, Thomas Eppinger, Kuanjin Han

9:25 Paper 123d: Application of CPFDEM Method in the Simulation of Horizontal Dense Phase pneumatic Conveying of Pulverized Coal — Yong Jin, Haifeng Lu, Xiaolei Guo, Xin Gong

(124) Crystalization I

Thursday, Apr 26, 8:15 AM

Marriott, Crystal C
Doris Segets, Chair
Sponsored by: Particle Design

8:15 Paper 124a: Inhibition of Scale Formation By Surfactants: Fundamentals and Applications — Juan Tanquero

8:35 Paper 124b: Dominant Role of Chemical Diffusion and Reaction in Shaping Particles — Yongsheng Han, Tao Yang

8:55 Paper 124c: Crystal Polymorphism of Particles Formed Via Monodisperse Droplet Evaporation — Victoria Karakis, Kelly M. Carver, David Trauffer, Anna Maassell, Ryan C. Snyder


(125) Design and Analysis of Hoppers, Silos, Chutes & Feeders - Theory and Practice

Thursday, Apr 26, 8:15 AM

Marriott, Crystal B
David A. Craig, Chair
Massimo Polletto, Co-Chair
Sponsored by: Handling & Processing of Granular Systems


8:37 Paper 125b: Modeling Limiting Flow Rate of Fine Powders through Hoppers — Madhusudhan Kodam, Karl Jacob

8:50 Paper 125c: Optimization Design of an Aerated Hopper for the Cohesive Pulverized Coal Discharge — Haifeng Lu, Xiaolei Guo, Xin Gong

9:21 Paper 125d: Going with the (mass) Flow: Retrofitting Screw and Hopper Insert Technology for Improved Feeding of Milled Phosphate in Egypt — Eddie Mc Gee, Ian Hancock

(126) Electrification and Charge Control I (Invited Talk)

Thursday, Apr 26, 8:15 AM

Marriott, Crystal D
TECHNICAL SESSIONS

Tatsushi Matsuyama, Chair
Sponsored by: Particle Interactions

8:15 Paper 126a: Electrostatics of Dry Powder Aerosols for Inhalation — Philip Kwok

8:45 Paper 126b: Electrostatic and Dispersion of Particles Using Mesh Electrode — Mizuki Shoyama, Shuji Matsusaka

9:05 Paper 126c: Novel Electrostatic Field Meter Using Rolling Sector (first report) — Kwangseok Choi, Teruo Suzuki


(127) Experiments and Demonstrations in Particle Technology
Thursday, Apr 26, 8:15 AM
Marriott, Crystal K
Ben Freireich, Chair
Sponsored by: Education

8:15 Paper 127a: Development of Table Top Experiments in Solids Processing — George Klinzing, Cliff Kowall

9:00 Paper 127b: Visualization for Powder Technology Education — Haim Kalman, Dmitry Portnikov

(128) Particle-Fluid Reactions
Thursday, Apr 26, 8:15 AM
Marriott, Crystal M
Bruce D. Hook, Chair
Sponsored by: Applications of Solids Processing Unit Operations

8:15 Paper 128a: DIFREX Reactor and Technology Solutions for Many Particle Types and Sizes in Catalytic and Non-Catalytic Systems — Stephen C. Arnold, P.E., Aashish Gaurav, PhD, Subhash Dutta, PhD, Jim Brenner, PhD

8:45 Paper 128b: Erosion and Mobilisation of Highly ACTIVE Simulant Suspensions with Impinging Vertical Jets — Joshua Croft

9:15 Paper 128c: REAL WORLD Examples of Influences of Particles and Cake Formation on SOLID-Liquid Separation Technology Operation — Barry A. Permutter

(129) Particle Technology Applications to Pharmaceutical Continuous Processes I
Thursday, Apr 26, 8:15 AM
Marriott, Crystal L
Aditya Vanarase, Chair
Luke Schenck, Co-Chair
Sponsored by: Applications of Particle Technology for Pharmaceuticals

8:15 Paper 129a: Investigation of Different Continuous Drying Routes for Pharmaceuticals — Manuel Kreimer, Manuel Zetti, Isabella Aigner, Stephan Sacher, Markus Krumme, Thomas Mannschott, Peter van der Wel, Albert Kaptain, Johannes G. Kihnast


9:01 Paper 129c: The Axial Dispersion Performance of a Novel Oscillatory Flow Reactor with Liquid Solutions and Solids Suspensions - a Design of Experiments Approach — Patricia Cruz, Carolina Silva, Fernando Rocha, António Ferreira


(130) Transport Phenomena and Reactor Performance I
Thursday, Apr 26, 8:15 AM
Marriott, Crystal E
Xiaotao Bi, Chair
Tingwen Li, Co-Chair
Sponsored by: Fluidization & Multiphase Flow

8:15 Paper 130a: Performance in Multi-Stage Fluidized Bed Reactors: From Theory to Industrial Application — Chenxi Zhang, Weizhong Qian, Fei Wei

8:45 Paper 130b: Spray Granulation in Continuously Operated Horizontal Fluidized Beds: Investigation of the Particle Transport Behaviour and the Product Properties in a Multi-Staged System — Eugen Diez Sr., Stefan Heinrich


(131) Plenary: An Industrial Perspective on the Future Needs in Solids Processing Research and Education (Invited Talk)
Thursday, Apr 26, 10:30 AM
Marriott, Crystal G
Ray Cocco, Chair
Sponsored by: 8th World Congress on Particle Technology

10:30 Paper 131a: An Industrial Perspective on the Future Needs in Solids Processing Research and Education — Kari Jacob

11:30 WCPT9 Information

12:00 Concluding Remarks

(132) Characterization of Nanoparticles II
Thursday, Apr 26, 1:30 PM
Marriott, Crystal A
Martin Morgeneyer, Chair

Sponsored by: Particle & Bulk Powder Characterization

1:30 Paper 132a: A Mobile Device for Nanoparticle Characterization By Wide-Angle Light Scattering (WALS) and Laser-Induced Incandescence (LII) — Simon Aßmann, Franz J. T. Huber, Stefan Will

1:45 Paper 132b: Complimentary Techniques to Directly Characterize Liposomes: Nanoparticle Tracking Analysis, Dynamic Light Scattering, and Electrophoretic Light Scattering — Ray Cocco, Graham J. Taylor, Nina Tamaddoni, Ulf Nobbmann, Duncan Griffiths


2:15 Paper 132d: In Situ Deformation and Breakage of Sol-Gel Derived Oxide Particles inside a SEM — Stefan Romeis, Patrick Herre, Jan Schwenger, Mirza Maćković, Thomas Pribylita, Erdmann Spiecker, Wolfgang Peukert

2:30 Paper 132e: Size and Polydispersity of a Nanoparticle Reference Material By Dynamic Light Scattering — Ulf Nobbmann, Ana Morfesis

2:45 Paper 132f: A Comprehensive Brownian Dynamics Based Forward Model for Analytical (Ultra) Centrifugation — Thaiseum Thajudeen, Maximilian Uttinger, Johannes Walter, Simon E. Wawra, Wolfgang Peukert

(133) Computational Methods for Industrial Fluidization Applications & Process Scale-Up II
Thursday, Apr 26, 1:30 PM
Marriott, Crystal F
Ben Freireich, Chair
Tingwen Li, Co-Chair
Sponsored by: Fluidization & Multiphase Flow

1:30 Paper 133a: Scale up Practices for Today’s Breakthrough Technologies — Carlo Badiola, Charles Costenbader, Matthew A. Hamilton, John Pendergrass, Peter Blaser, Reddy Kant, Ted Knowlton, Ben Freireich, Ray Cocco
1:30 Paper 140a: How to Conduct a Dust Hazards Analysis (DHA) — Michelle Murphy, Matthew Borene

2:00 Paper 140b: Combustible Dust Management Screening: Methodology and Tool Development — Sean Clasen, Merrill Childs, Rene Murata

2:30 Paper 140c: Risk-Based Dust Hazard Analysis (DHA) — Fuman Zhao

(141) Combustible Dust Hazards and Their Mitigation II
Tuesday, Apr 24, 3:30 PM
Marriott, Grand Ballroom 7A
Jérôme Taveau, Chair
Susan Bershad, Co-Chair
Sponsored by: Combustible Dust Safety


4:00 Paper 141b: Electrostatic Hazards during Pneumatic Conveying of Combustible Dusts in Flexible Hoses — Michael Stern, Sean J. Dee, Alfonso F. Ibarreta, Russell Ogle, Timothy J. Myers

4:30 Paper 141c: Experimental and Theoretical Investigation of the Lower Explosion Limit of Multi-Phase Hybrid Mixtures — Emmanuel K. Addai, Paul R. Amyotte, Ulrich Krause

5:00 Paper 141d: Analysis of Dust Concentration Measurements Taken during the Filling Process of a Silo — Lahiru Lakshan Lulbadda Waduge, Stefan Zigan, Pablo Garcia Triñanes

10:45 Paper 142b: Analysis of Dust Concentration Measurements Taken during the Filling Process of a Silo — Lahiru Lakshan Lulbadda Waduge, Stefan Zigan, Pablo Garcia Triñanes

11:15 Paper 142c: The Design and Operation of Multi-Point Dust Collection Systems — Yi Fan, Karl Jacob, James F. Koch
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  Scottsdale, AZ

- **Metabolic Engineering 12 (SBE/IMES)**
  June 24–28, 2018
  Munich, Germany

- **Conference on Constraint-Based Reconstruction and Analysis (SBE/IMES)**
  October 14–16, 2018
  Seattle, WA

- **Rock Stars of Regenerative Engineering**
  October 27–28, 2018
  Pittsburgh, PA

- **2nd International Conference on Plant Synthetic Biology, Bioengineering, and Biotechnology**
  November 29–December 1, 2018
  Clearwater, FL

- **International Conference on Stem Cell Engineering**
  December 5–7, 2018
  Los Angeles, CA

- **8th International Conference on Biomolecular Engineering**
  January 6–9, 2019
  Newport Beach, CA

**Chemical Engineering Practice**

- **Conference on Accelerating Biopharmaceutical Development**
  February 17–19, 2019
  Carlsbad, CA

**Process Safety**

- **Annual Safety in Ammonia Plants and Related Facilities Symposium**
  September 16–20, 2018
  Toronto, ON, Canada

- **6th CCPS China Conference on Process Safety**
  September 25–27, 2018
  Qingdao, China

- **2018 European Conference on Process Safety and Big Data**
  November 14–15, 2018
  Frankfurt am Main, Germany

**Energy**

- **Offshore Technology Conference**
  April 30–May 3, 2018
  Houston, TX

- **Natural Gas Utilization Workshop**
  August 13–14, 2018
  College Station, TX

- **12th Natural Gas Conversion Symposium**
  June 2–6, 2019
  San Antonio, TX

Conferences and dates subject to change.
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