



12th IFPRI Workshop on Particle Technology

Powder Reconstitution

June 13-14, 2024

**Toronto Hilton Hotel
Toronto, Ontario Canada**

Co-Chairs

**Pete Bergstrom (Silanano Technology) Wilson Poon (Edinburgh University)
Eric Furst (University of Delaware) Francisco Blanco (Danone)
Isabelle Deleris (Cargill) Michel Louge (Cornell University)**

Workshop Committee

**Jim Michaels (IFPRI) Kalyn Froeschle (Dow) Brian Levy-Polis (FMC)
Simon Greener (P&G) Matt Maille (Keurig DP) Judith Bonsall (Unilever)
Nabs Ahmed (Keurig DP)**

Motivation and Objectives

The purpose of the workshop is to provide context on challenges in understanding the phenomena of powder reconstitution. Discussions within small groups of academics and industrial representatives will be organized around three main pillars, identified as essential in processing mixtures of solids and liquids, namely (1) cultivating a deep fundamental understanding of mechanisms involved in powder reconstitution and the relationships with material science; (2) identifying and overcoming challenges in scaling powder/liquid processes, notably regarding kinetics ; and (3) identifying best practices and characterization techniques for raw materials, process monitoring, and product performance testing. Through the workshop, we intend to define scientific questions that IFPRI and other agencies should promote to fund research projects in the field.

Workshop Format

There will be four half-day sessions with industrial and academic presentations followed by syndicate group discussions. Each session is focused on one of the following topics: (1) outline the industrial state-of-the-art in powder reconstitution;

(2) fundamentals in the wetting of powders

(3) fundamentals of reconstitution process; dispersion, dissolution, swelling, gelling, process characterization, and achieving desirable product performance

(3) gap identification and define three scientific questions that IFPRI and other funding agencies should promote.

Participants will be divided into syndicate groups to brain storm the industrial and academic questions raised during the presentations. Each group has a syndicate leader that will report a summary of idea generations and brainstorming discussions of each group to all of the participants.

Invited Speakers and Attendees

Invited academic speakers, industrial speakers and guests have been identified and include the following:

Academic Speakers

Mathis Frike (TU Darmstadt)

Heinrich Jaeger (U. Chicago)

Yves Meheust (U. Rennes)

Guillaume Ovarlez (U. of Bordeaux)

David Quere (CNRS and École Polytechnique)

Pat Spicer (U. of New South Wales)

Industrial Speakers

Laurent Forny (Nestle)

Kalyn Froeschle (Dow)

Brian Ley-Polis (FMC)

Marty Murtagh (Corning)

Mingzhe Yu (Johnson Matthey)

Syndicate Leaders

Annie Colin (ESPCI Paris)
Heather Emady (Arizona State U.)
Rachel Smith (U. Sheffield)
Eckart Meiburg (U. California SB)
Olivier Pouliquen (Aix-Marseille U.)

Invited Guests

Daniel Hodgson (U. Edinburgh)
Suzanne Kresta (U. Saskatchewan)
Arno Kwade (U. Braunschweig)
Jeff Morris (City College New York)
Marco Ramaioli (U. Paris)
David Scott (Advanced Particle Sensors)
Gul Ozkan Taskin (U. Loughborough)
Paul Umbanhowar (Northwestern U.)

Workshop Site, Hotel Reservations, and Directions

The workshop will be held at the Toronto Hilton Hotel located at 145 Richmond St. West in downtown Toronto. Phone number 844-208-8339. We have negotiated a conference rate for rooms at \$329/night CAD (Canadian dollars), but rooms have to be reserved by May 13, 2024 to get that rate. Please note that hotels are quite pricey in Toronto, but there are many to choose from close to the venue, if you would like to consider other options. The link for rooms at the IFPRI rate is

<https://book.passkey.com/go/IFPRIAnnualGeneralMeeting2024>.

Most of us will be coming to the meeting through the Toronto Pearson Airport. You have two options to get from Pearson Airport to the hotel. A cab from the airport to the hotel takes about 30 minutes (except during rush hour) and costs about \$70 CAD. Alternatively, you can take the train from the airport to Union Station (about 30 minutes) and walk about 1.1 km to the hotel. The cost for the train from the airport to Union Station is about \$12 CAD one way. You can reserve tickets on the train at the following link for any day (https://www.upexpress.com/en/buy-tickets?%3F=&utm_campaign=UP%20Express%20Masterbrand&utm_source=google&utm_medium=sem_paid&utm_term=conversion&utm_term=EN-US-Inbound&gad_source=1&gclid=Cj0KCQjwztOwBhD7ARIsAPDKnkAHxfA_eFigqmQ04pDfX15tQq3h1mRBQ-qH4JKEHihdeyUAceOAKTkaAsP5EALw_wcB&gclid=aw.ds).

Map for the route from Union Station to the Hotel is shown below:



Thursday June 13

Time	Title	Speaker
8:00	Welcoming Comments	Willie Hendrickson
8:05	Workshop Objectives	Kalyn Froeschle, Nabhan Ahmed
8:25	Introduction to Session 1: Powder reconstitution in Industry	Isabelle Daleris
8:30	The Reconstitution Enigma of Nonmetallic Slips	Marty Murtagh, Corning
8:55	Science of Reconstitution: recent progresses and upcoming challenges	Laurent Forny, Nestle
9:20	Industrial Talk 3	Kalyn Froeschle, Dow
9:45	Industrial Talk 4	Mingzhe Yu, Johnson Matthey
10:10	Crop Protection Water Dispersible Granules: formulation development and launch troubleshooting	Brian Levy-Polis, FMC
10:35	Coffee Break	
11:00	Breakout Session 1 Instructions	Michel Louge
11:05	Breakout Session 1: What are the major gaps and challenges in powder reconstitution?	
12:00	Lunch	
13:00	Breakout Session 1 Report Out	
13:30	Introduction to Session 2: Wetting of powders	Francisco Blanco
13:40	Capillary Imbibition: Progress in Understanding Powder Wetting Phenomena and applications	Mathis Frike, TU Darmstadt
14:10	Grains at Interfaces - principles and applications to liquid marbles	David Quere, ESPCI Paris
14:40	Sparse Fiber Structures to Minimize Powder Mass and Maximize Rehydration	Pat Spicer, University of New South Wales
15:10	Coffee Break	
15:25	Breakout Session 2 Instructions	Eric Furst
15:30	Breakout Session 2: What is current state of understanding of wetting and capillarity?	
16:30	Coffee Break	
17:00	Breakout Session 2 Report Out	
17:30	Adjourn	
19:00	Workshop Banquet	

Friday June 14

Time	Title	Speaker
8:30	Introduction to Session 3: Dispersion	Pete Bergstrom
8:40	Highly Concentrated Particulate Suspensions: Challenges and Opportunities	Heinrich Jaeger, University of Chicago
9:10	Rheology of suspensions close to the jamming volume fraction	Guillaume Ovarlez, University of Bordeaux
9:40	Chaotic Stokes flow in 3D Granular Porous Media and its Impact on Solute Mixing	Yves Meheust, University of Rennes
10:10	Coffee Break	
10:40	Instructions for Breakout 3	Wilson Poon
10:45	Breakout Session 3: What are the rheological and fluid mechanical challenges in power reconstitution?	
11:45	Lunch	
12:45	Breakout Session 3 Report Out	
13:15	Introduction to Session 4	Jim Michaels
13:25	Breakout Session 4: What are the gaps in fundamental understanding of powder reconstitution?	
14:25	Coffee Break	
14:55	Breakout Session 4 Report Out	
15:25	Full-Group Discussion: What are the research priorities for advancing understanding of powder reconstitution?	
16:25	Adjourn	