



# **10<sup>th</sup> IFPRI Workshop on Particle Technology**

**Mechanisms of Cohesion at the Single Particle Level and  
their Influence on Bulk Properties**

**January 13-14, 2020**

**Philadelphia Airport Marriott Hotel  
Philadelphia, PA USA**

**Co-Chairs: Massih Pasha (Chemours)  
Jeremy Lechman (Sandia National Laboratories)  
Marty Murtagh (Corning)  
Michel Louge (Cornell University)**

## **Motivation and Scope**

The workshop will explore mechanisms of cohesion between individual particles, how to characterize and model them, and how to relate them to static and dynamic properties of bulk powders.

## **Workshop Objectives**

1. Develop a common vocabulary for cohesion.
2. Understand the strengths and limitations of theories, modeling approaches, and characterization methods.
3. Develop a framework for future research needed to advance predictive modeling of cohesive powder behavior.

## **Workshop Format**

There will be four half-day sessions each of which includes industrial and academic presentations followed by syndicate group discussions. Each session is focused on one of the following topics:

- Mechanisms of Single Particle Cohesion → what are they? Do we have a standardized definition for cohesion and its mechanisms?
- Characterization of Cohesion →
- Modeling of Cohesion and Cohesion in Simulations → Are the characterization methods at single particle level available/representative/reliable?
- Future thoughts/research on cohesion → what should be the future focus of research on ‘cohesion’?

In each session an industrialist will give a 20-minute presentation laying out industrial challenges and needs in the particular focus area. This will be followed by two academic presentations (30 minutes each) to form fundamental questions/challenges to be discussed during syndicate groups. Participants will be divided into syndicate groups to brainstorm 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.

## Sunday January 12

Happy Hour Philadelphia Marriott Aviation Bar  
Members, Academics, Consultants, Guests, Accompanying Persons 1800-2000

## Monday January 13

Breakfast Aviation Bar and Grill Philadelphia Marriott Hotel  
All Attendees 0630-1000

Registration Outside Meeting Rooms 4 and 5 Philadelphia Marriott Hotel  
All Attendees From 0800

Open Workshop Meeting Rooms 4 and 5 Philadelphia Marriott Hotel  
All Attendees Massih Pasha, Chair

0830	Welcome	Willie Hendrickson (IFPRI)
0835	Workshop Objective	Massih Pasha (Chemours – USA), Chair

Session I Physics of Cohesion  
All Attendees Jeremy Lechman (Sandia National Laboratories), Chair

0845	Session Objective	Marty Murtagh (Corning – USA)
0855	Industrial Perspective	Willie Hendrickson (AVEKA – USA)
0915	Clustering of Cohesive Particles	Jean-Christophe Geminard (ENS Lyon – FRANCE)
0945	Electrostatics	Heinrich Jaeger (University of Chicago – USA)
1015	Coffee	
1030	Breakout Discussions	Locations and Formats to be Announced in Meeting
1115	Syndicate Leader Preparation	
1130	Presentations by Syndicate Leaders	Syndicate Leaders

Lunch  
All Attendees 1200-1300

Session II		Microscale Characterization
All Attendees		Michel Louge (Cornell University), Chair
1300	Session Objective	Tim Bell (DuPont - USA)
1310	Industrial Perspective	Dan Burnett (Surface Measurement Systems – USA)
1330	Surface Modification	Jerry Heng (Imperial College – UK)
1400	Microstructural Characterizations	Ryan Hurley (Johns Hopkins - USA)
1430	Coffee	
1445	Breakout Discussions	Locations and Format to be Announced in Meeting
1530	Syndicate Leader Preparation	
1545	Presentations by Syndicate Leaders	Syndicate Leaders
1615	Discussion on Sessions I and II	All
1700	Session Close	

10<sup>th</sup> IFPRI Workshop Banquet and Happy Hour 1830-2200  
 Location To Be Announced  
 Members, Academics, Consultants, Guests, Accompanying Persons

## Tuesday January 14th

Breakfast	Aviation Bar and Grill	Philadelphia Marriott Hotel
All Attendees		0630-1000

Registration	Outside Meeting Rooms 4 and 5	Philadelphia Marriott Hotel
All Attendees		From 0730

Open Workshop	Meeting Rooms 4 and 5 Philadelphia Marriott Hotel	
All Attendees	Massih Pasha (Chemours – USA), Chair	
0800	Review of Yesterday’s Meeting	Massih Pasha (Chemours – USA)

Session III	Cohesion in Models and Simulations	
All Attendees	Marty Murtagh (Corning – USA), Chair	
0810	Session Objective	Marty Murtagh (Corning – USA)
0820	Industrial Perspective	Bill Ketterhagen (AbbVie - USA)
0840	Fluidization, Effects of Cohesion on Drag	Sankaran Sundaresan (Princeton – USA)
0910	Electrostatics	Alissa Park (Columbia – USA)
0940	Coffee	
0955	Breakout Discussion	Locations and Format to be Announced in Meeting
1040	Syndicate Leader Preparation	
1055	Presentations by Syndicate Leaders	Syndicate Leaders

Lunch		
All Attendees		1130-1230

Session IV	Future Thoughts on Cohesion	
All Attendees	Jeremy Lechman (Sandia National Laboratories), Chair	
1230	Session Objective	Jeremy Lechman (Sandia National Laboratories)
1240	Industrial Perspective	Karl Jacob (University of Michigan – USA)
1300	Single Particle Effects	Casey Lamarche
1330	Surface Modification	Raj Dave (NJIT – USA)
1400	Breakout Discussions	Locations and Format to be Announced in Meeting
1445	Syndicate Leader Preparation and Coffee Break	
1500	Presentations by Syndicate Leaders	Syndicate Leaders

Session V

Outputs from the Meeting

All Attendees

Massih Pasha (Chemours – USA), Chair

1535	Discussion of Workshop and Plans Going Forward	All
1700	Close of Workshop	