Center for Particulate and Surfactant Systems

A National Science Foundation Industry/University Cooperative Research Center (NSF I/UCRC) since 2008

Industrial Advisory Board (IAB) Meeting
February 17-18, 2010
University of Florida, Gainesville, FL

~ Agenda ~

~ Thursday, February 18, 2010 ~
Seminar Room 202, Particle Science & Technology Building, University of Florida
Closed-Door Meeting ~ IAB Members Only

8:00 A.M. - 8:30 A.M.	**Continental Breakfast**
8:30 A.M. - 10:00 A.M.	**L.I.F.E. Form Review & Discussion**
10:00 A.M. - 11:30 A.M.	**IAB Executive Meeting** *Prospects & Opportunities* • Industry Perspective • Outcomes from Working Lunch Session *Recruitment Strategies* • Membership *Election Procedure for Executive Committee Members* • Chair and Vice-Chair *NSF Evaluator's Report Highlights (Dr. Vida Scarpello)* *Future Meeting Dates* • Fall 2010 and beyond at Columbia University (August 19, 2010) • Spring 2011 and beyond at the University of Florida (February 16-17, 2011)
11:30 A.M.	**Summary Remarks & Meeting Adjournment** ***Dr. Brij M. Moudgil & Dr. P. Somasundaran, CPaSS Directors***

Tours of the Particle Engineering Research Center and Nanoscale Research Facility will be available after adjournment

Center for Particulate and Surfactant Systems

A National Science Foundation Industry/University Cooperative Research Center (NSF I/UCRC) since 2008

Industrial Advisory Board (IAB) Meeting
February 17-18, 2010
University of Florida, Gainesville, FL

~ Closed-Door Meeting Minutes ~

~ Thursday, February 18, 2010 ~
Seminar Room 202, Particle Science & Technology Building, University of Florida
IAB Members Only

Introduction & Welcome
Greg Spontak (Vice Chair, CPaSS Executive Committee) acted as the chair and moderator during the closed door meeting for IAB members.

Meeting was called to order at 8:35 A.M.
- Welcome by Greg Spontak & Dr. Brij M. Moudgil
- Meeting agenda (attached)
- Meeting objectives: To discuss the results summary from the L.I.F.E forms collected during the technical sessions the day before and advise the Center Leadership on the issues listed on the agenda.

L.I.F.E. Forms Discussion
Regrettably, we were unable to capture the names/affiliation of all those who made specific comments. Please let us know if we have missed any major items so that we can incorporate them in the final version of this document.

General Comments
- CPaSS researchers should directly address and follow-up in writing with regard to the comments/questions/ suggestions in the L.I.F.E. forms, either immediately or by the next meeting. Similarly, IAB Members should try to engage the researchers on this front.
- If any IAB Member would like to send samples to the researchers, please contact Dr. Brij M. Moudgil (bmoudgil@perc.ufl.edu) or Dr. Maria Palazuelos (mpalazuelos@perc.ufl.edu) for the Florida Site and Prof. P. Somasundaran (ps24@columbia.edu) for the Columbia Site.

(*Greg Spontak*) Researchers need to show how their research applies directly to the products/processes of our IAB Members in order to hook them, i.e., they need to 'sell their ideas'. Best way to engage a company is to clearly show to them how the research presented would benefit, impact, improve…etc their product line.

(*Greg Spontak*) The summary presented here on the L.I.F.E. Forms is an overview of the most significant comments collected after the technical presentations.

<u>Dispersion in Air of Micron and Nanometer Sized Particulate Systems: Predicting Agglomerate Strength (N. Stevens)</u>
Questions/Comments
- No questions or comments were made about this project during this discussion.

Triboelectric Phenomena in Particulate Materials: Role of Particle Size, Surface Properties, and Vapor (S. Brown)

Questions

- How is the AFM being used here? Dr. Moudgil clarified that AFM is to measure localized charge density, not size per se.
- (*Greg Spontak*) How broad is the use of AFM in industry? (*Akzo Nobel*) AFMs are rarely being used, it's not a production tool - there's a very 'fine art' to AFM measurements that requires specialized expertise.

Comments

- (*Paul Ferm*) Some Member companies have approached other Centers to take advantage of equipment such as AFM and any other specialized training required to utilize it-Opportunity for CPaSS to further leverage on this.
- There would be considerable interest if a seminar/short-course/workshop were offered.

Design of Optimum Sampling Plans: 1 - Dry Powders (H. El-Shall)

Questions

- Potential paper for ASTM? (*Kerry Johanson*) Not so much as a method but an applied compendium of instructive materials. ISO has already published guidelines on sampling.
- How do we tie this to ISO 9000/14000?

Comments

- Many companies rely on COAs (certification of analysis, specifications from suppliers).
- Storage/aging/etc. need to be taken into account on this module.
- (*Greg Spontak*) Do not try to reinvent the wheel (on sampling), as there are lots of resources out there.
- Need to leverage this work to generate additional resources. Item of interest to many Members and other companies not yet in CPaSS.
- A video module is not very practical for plant engineers/technicians, a one page document easy to read and access would be used extensively in a way similar to SOPs (Standard Operating Procedures).
- This module needs to 'get out there' – so researchers and plant operators can make use of it instead of searching on Wikipedia/Google.

Green Surfactants: Structure, Properties and Performance of Model Green Surfactant Systems (J. Wu)

Questions

- How to overcome IP hurdles? The idea of working on benchmark references was extensively discussed

Comments

- (*Pat Macy*) Does evaluation include shelf-life/preservation? This project needs to make sure the product works in the applications, not just in an ideal model system or environment.
- (*Pat Macy*) Would it still be effective as a surfactant? One would want biodegradable materials, but not to degrade before they get used!
- (*Greg Spontak*) These projects need to get in real world sample/products/formulas - need to pick a few specific areas to apply these green surfactant, then get into the proprietary issues
- (*Pete He*) Performance driven projects vs characterization/academic driven projects: if benchmark is design/chosen close enough to make real applications (personal care, household cleaning, etc.), results may be useful to Member companies.
- (*P. Som*) Best way to validate is a 3-4 way validation where companies test the products in their real applications
- (*B. Moudgil*) Companies/IAB Members could help by providing benchmark references for each sector so precompetitive research is facilitated and we know we're on the right path.
- (*Markus Doerr*) What's missing is testing the new green molecules against any benchmarks - IAB Members can help on this front.
- (*Kerry Johanson*) IPPD project format here at UF could also help on these efforts (i.e., to serve as a basis for the projects - faculty mentor/coach/industry mentor).

Studying Enzyme / Green-Surfactant Interactions: Minimizing Antagonism while Maximizing Synergies (M. Chin)

Questions/Comments

- No questions or comments were made about this project during this discussion.

New Methods for the Characterization of Nanoparticles and Correlation with Their Toxicity (X. Fang)

Questions

- Chemistry vs. toxicity? It seemed that toxicity was not properly tested or explained.

Comments

- (*Michael Fevola*) There is some concern on the chemistry of particles being a factor – there is a pulling apart of the two models (chemical vs. physical)

Particle-Process Analytical Technology (P-PAT) (K. Powers)
Questions
- (*Pete He*) What is the status from commercialization standpoint?

Comments
- (*Kerry Johanson*) Needs to have a model-based control for it to go further in industry and be useful for other applications.
- The parameters being changed to affect the system were missing from the presentation, should be added as they are of interest to industry.
- Roadmap may be needed (technical side makes sense, but what are the next steps to transfer it to industry Members?)

Dilute Suspension Flow: An Experimental and Modeling Study (J. Curtis)
Questions/Comments
- No questions or comments were made about this project during this discussion.

Impact of Fine Silicate Minerals on Rheology, Gas Dispersion and Mineral Separation: Micro-Aggregate - Macro-Network Model (P. Patra)
Questions/Comments
- (*D. Nagaraj*) Presented in the wrong forum and may not be getting the right attention. This project is very specific to only few Members. May be better discussed in a separate meeting.

Fundamental and Applied Studies for Selective Copper/Au/Ag Mineral Separation and Control of Slimes from Altered Silicates (M. Khandrika)
Questions/Comments
- By combining both projects (P. Patra and this one) in one single presentation it caused confusion among Members.

Grinding Aids for Nano-Milling using a Stirred Media Mill (P. Sharma)
Questions/Comments
- No questions or comments were made about this project during this discussion.

Enhanced Photocatalytic Destruction of Microbes on Surfaces (V. Krishna)
Questions
- (*B. Moudgil*) How to approach companies about this project-what is the most appropriate format?

Comments
- (*Greg Spontak*) Peer review from industry (different sectors): IAB Members could help on conducting peer reviews at the IAB meeting. A mixed group of companies could give open guidance to students/researchers on a highlighted project.
- (*B. Moudgil*) Could we extend the format of the meetings to include the peer-review process within the 2-day meetings?
- (*Kerry Johanson*) You could begin the peer review process online to allow for more one on one time during the meeting.
- (*Steve Bolkan*) How does the center decide when projects are really in the scope of the center and when these projects should explore other avenues?
- (*Erik Sander*) At UF, tools are available to make presentations on a regular basis (i.e., Elluminate) - CPaSS will explore these resources and use them as appropriate.

Interactions between Cationic Polymers and Mixtures of Anionic Surfactants: Complex Properties, Phase Diagram and Binding Isotherm (B. Li)
Questions/Comments
- No questions or comments were made about this project during this discussion.

A Fundamental Study of Nanoparticle-Protein Mutual Interactions: Role of Nanoparticle Morphology and Size (Pyrgiotakis/Chernyshova)
Questions/Comments
- Very difficult to understand the presentation due to language barriers.

Other Agenda Items

Working Lunch

IAB attendees were split in three groups depending on their main interest (Particles, Surfactants and University Researchers). After one hour for separate discussions, each group presented their five top proposed themes for future research at CPaSS and votes were collected on that. The result was a priority chart presented at this time (Click here).

Comments

- Next time add ranking within each cluster by asking each team to sort their top selected themes.
- Was it done to narrow things down? The themes seemed somewhat broad.
- The wording/broadness of the given guidelines and each theme may have affected people's votes.

Suggestions

- More discussion time for each cluster would have been beneficial.
- Instead of voting with dots of equal value, use a weighted system (e.g., 9/3/1) - then the top choices will really come to the front and create some clarity.
- Industry members could post their comments ahead of time if they have the information before the meeting. This way discussion can be more focused.
- Post the questions to the CPaSS secure section.

Meeting Logistics

Fall 2010

Comments

- Go to a 1.5-day (start 1 PM first day and end at 4 PM on the second day) meeting to allow for those flying to maximize the overnight stay.
- (*Reg Davies*) Think differently about your format and how you present your content at the IAB Meetings.

Suggestions

- Rethink the format of the meeting so we could save time to be used on other topics.
- Do podcasts/online presentations ahead of time (i.e., need to do more in less time, so more frequent updates/ webcasts).
- (*Bruce Keiser*) Form subgroups interested in following specific projects and have frequent teleconferences/ webcasting/online meetings that go over the intimate details...inform those on the periphery of the projects at the IAB meetings.

Action Item

- **Fall 2010 Meeting will be at Columbia University on August 18-19, in New York, NY**
- **1 PM start time, poster session and networking dinner on the first day followed by day-long meeting until 4 PM the next day.**

Spring 2011

Action Item

- **Spring 2011 Meeting will be at the University of Florida on February 15-17, in Gainesville, FL**

Executive Committee

Action Item

- Elections will be held at the Fall 2010 IAB meeting at Columbia University to elect next IAB Executive Committee, and IAB Chair and Co-Chair.
- Volunteers are needed for all positions, especially the Chair and Vice Chair.

NSF Evaluator's Report Highlights

Comments

- Dr. Vida Scarpello (CPaSS NSF Evaluator – Florida Site) presented a summary of the report process, the CPaSS highlights from the most recent Evaluators' report (included in the CD from the meeting folder given to members) and also emphasized the importance of this process to guarantee continuing support from NSF to the Center.

Recruitment of Members

Comments

- Government agencies can join CPaSS, great tool for recruitment. Use Government contacts from Members to make the connection.

- (*Steve Giles*) CPaSS has success stories - bring those (plus industry testimonials) to the forefront for marketing successful recruitment.
- Use the LIFE forms as a tool to keep members by following up on their needs and feedback - watch for companies that are only interested in a single project – they may be Members at higher risk to drop out.
- The more we visit (one to one contact), the more companies will buy into CPaSS.

Suggestions

- (*Ren Xu*) Look into avenues for companies to get graduate fellowships established (but with no overhead cost)
- CPaSS should attend/exhibit during the NY Society of Cosmetic Chemists supplier's day (*suggested by Michael Fevola*) as a recruitment investment. Most Member companies in the sectors of consumer products and personal care attend that annual meeting as exhibitors or visitors. Great opportunity to meet potential Members.
- (*Greg Spontak*) CPaSS should organize a way for defining the center and developing a marketing package for the IAB Members to distribute among their clients and vendors.
- Use MBA faculty/students to do CPaSS' marketing analysis
- Sell companies on how CPaSS has direct applications to their products and processes.

Action Item

- (*Deepika Singh*) Get list of SBIR Phase II Awardees from NSF for recruitment purposes as they can take advantage of the NSF supplemental funds to pay for a whole membership

Meeting was adjourned at 12:30 P.M.

As recorded by Maria Palazuelos and Rodney Guico.

Brij M. Moudgil

Brij M. Moudgil
Director, CPaSS
University of Florida
205 Particle Science and Technology Building
Gainesville, Florida 32611
Phone: 352-846-1194
E-mail: bmoudgil@perc.ufl.edu

P. Somasundaran

P. Somasundaran
Co-Director, CPaSS
Columbia University
SW Mudd 905, MC#4711
New York, NY 10027
Phone: 212-854-8812
E-mail: ps24@columbia.edu

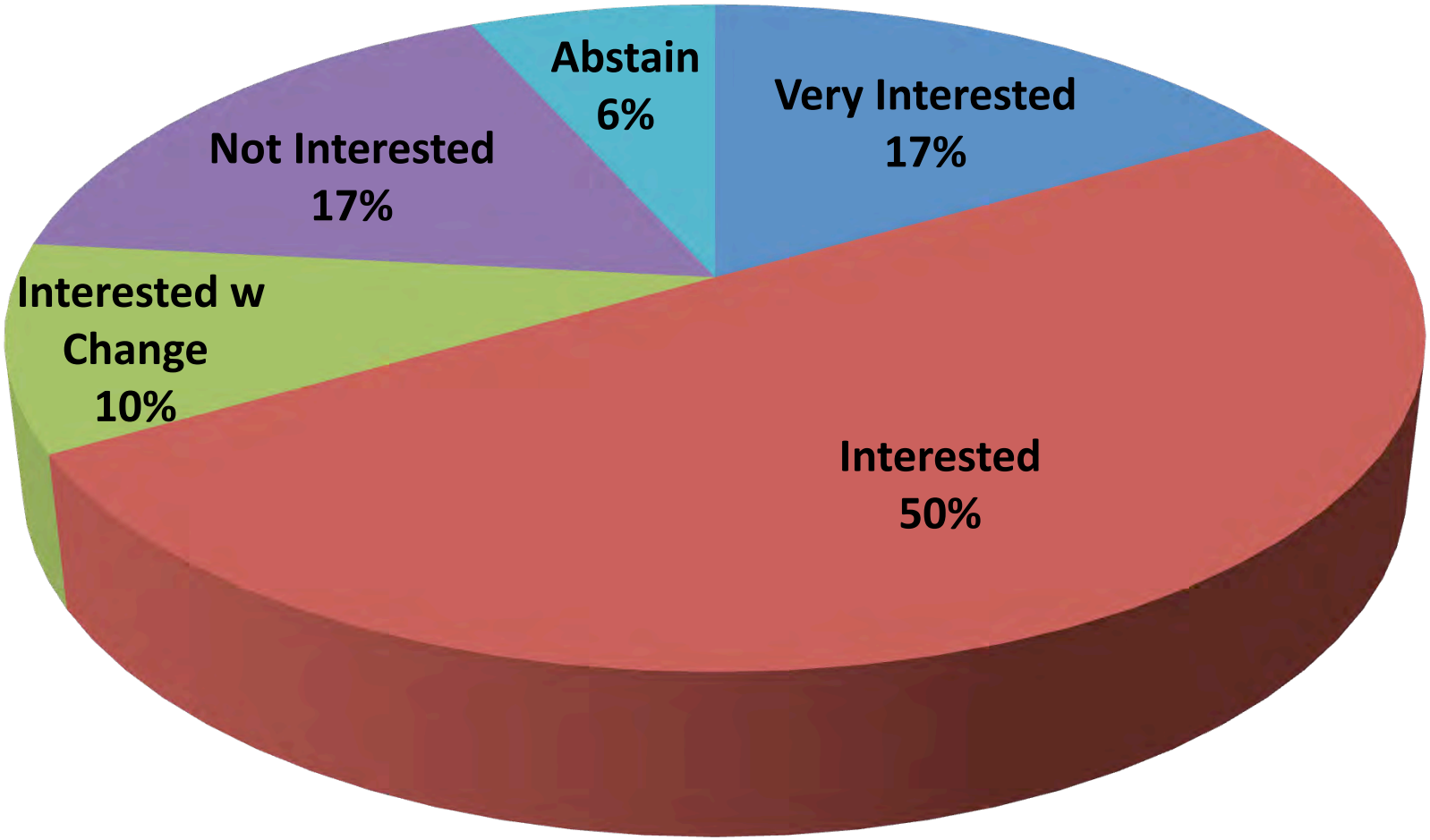
L.I.F.E.
Forms Overview

CPaSS IAB Meeting

February 17-18, 2010

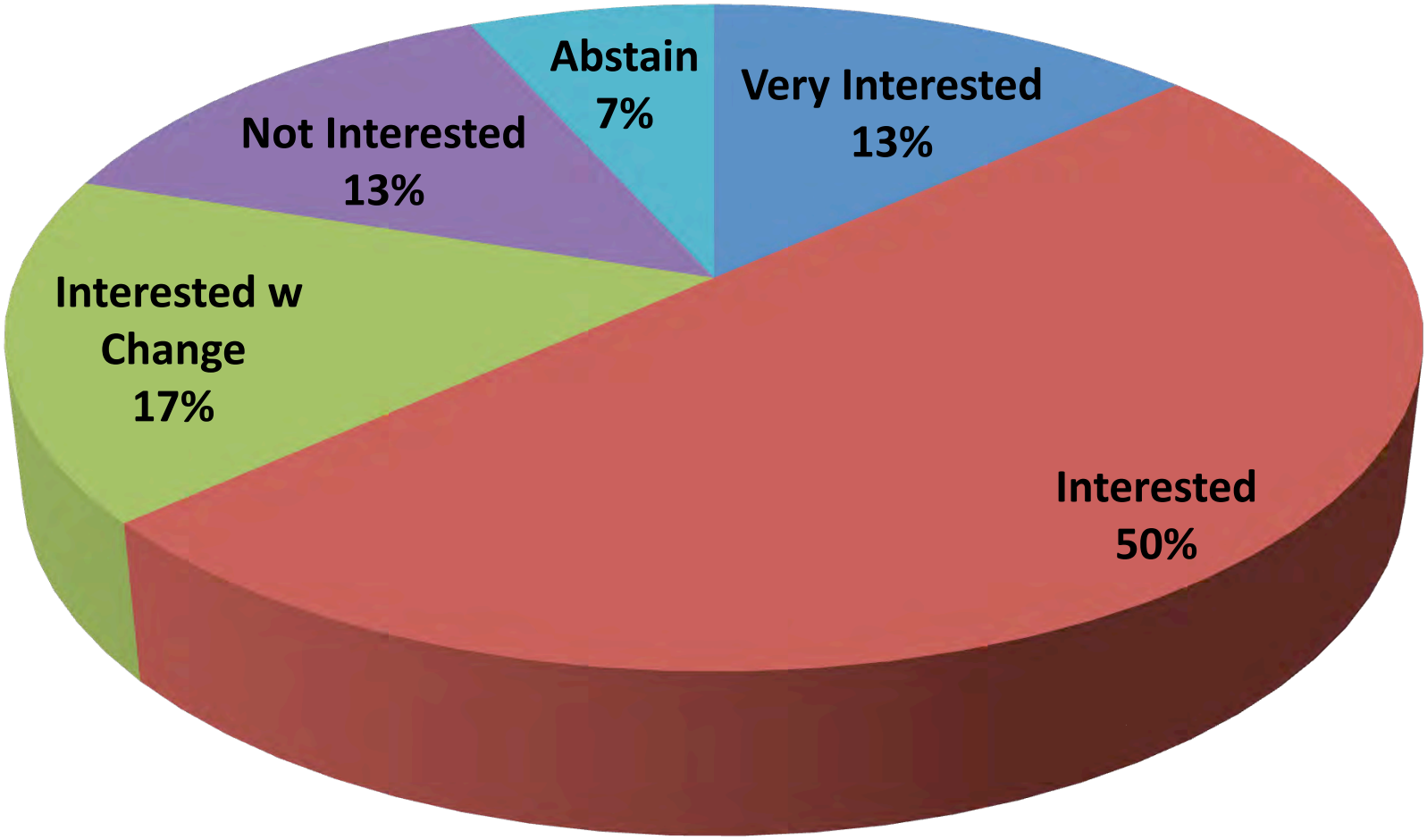
Gainesville, FL

Dispersion in Air of Micron and Nanometer Sized Particulate Systems:
Predicting Agglomerate Strength
Dr. Nate Stevens (University of Florida)



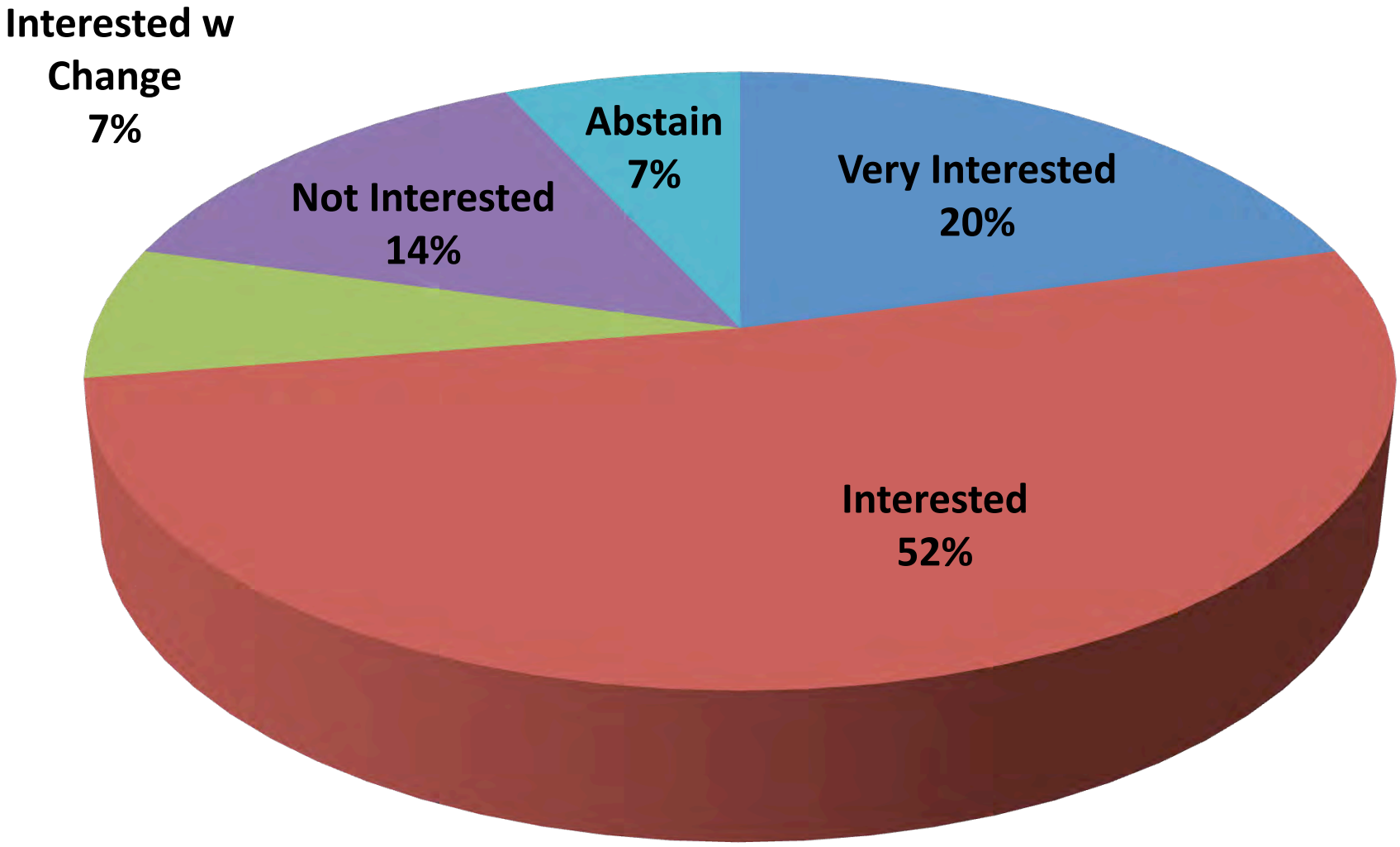
- Interest in knowing how contact angle is measured
- Effect of particle size/surface chemistry? Would need analysis of particles after treatment/testing.
- Would like to see broader possible options/ specific applications in industry
- Add a best value analysis of the possible alternatives/best protocols.

Triboelectric Phenomena in Particulate Materials: Role of Particle Size, Surface Properties, and Vapor
Dr. Scott Brown (University of Florida)



- How Is AFM better than other powder characterization techniques?
- Need more fundamental and deeper investigation of the surface chemistry and its impact on charging to enable data interpretation and development of predictive models
- Analysis of charging on water-based systems would be of interest for several Members
- Would be interesting to apply this technique to deposition of charged materials onto biological surfaces

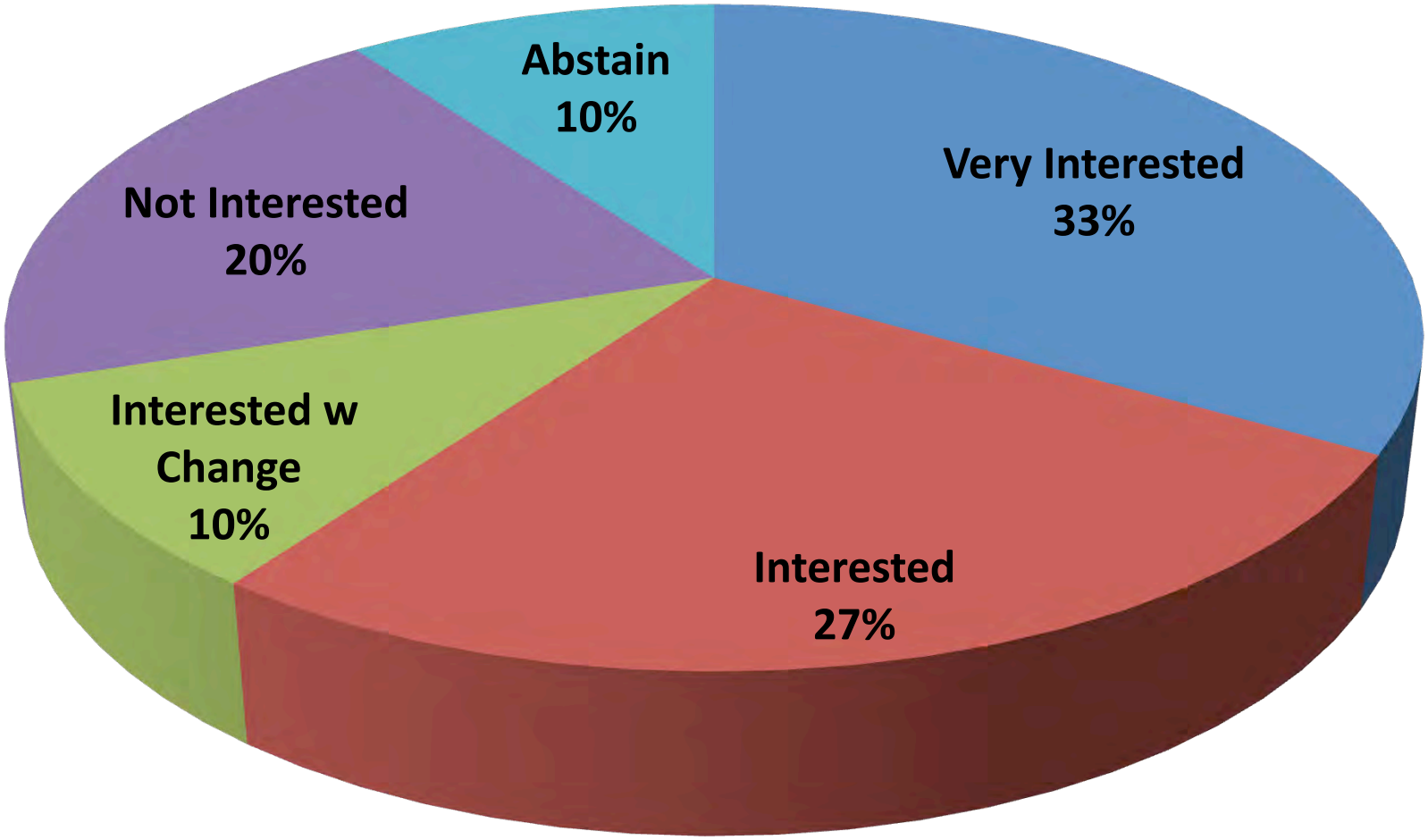
Design of Optimum Sampling Plans: 1 - Dry Powders
Dr. Hassan El-Shall (University of Florida)



- Very valuable for training purposes
- Make it simple (user friendly) for plant operators
- Will this be sent to ASTM?
- Good work, Would like to see wet / particles in solution sampling next

Green Surfactants: Structure, Properties and Performance of Model Green Surfactant Systems

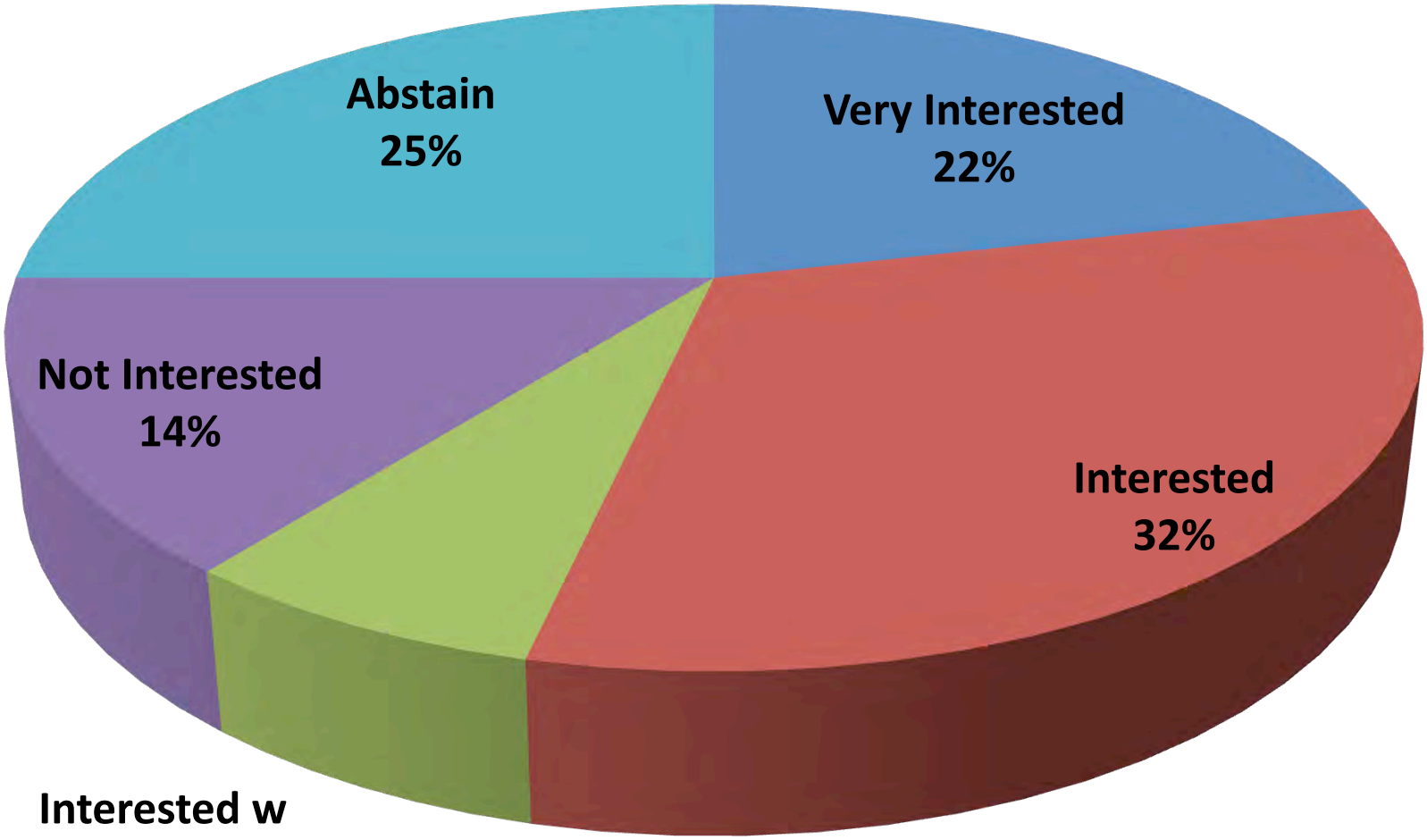
Jun Wu (Columbia University)



- Report progress on the behavior and performances of green surfactants vs. benchmark system.
- Besides green, toxicity, or biodegradability consider also the overall carbon foot print
- Good progress since last report
- Would be helpful if the complex equations can be simplified for easier use so they can be applied to real world systems
- Rigorous evaluation and validation of model will be required to confirm range of applicability

Studying Enzyme / Green-Surfactant Interactions: Minimizing Antagonism while Maximizing Synergies

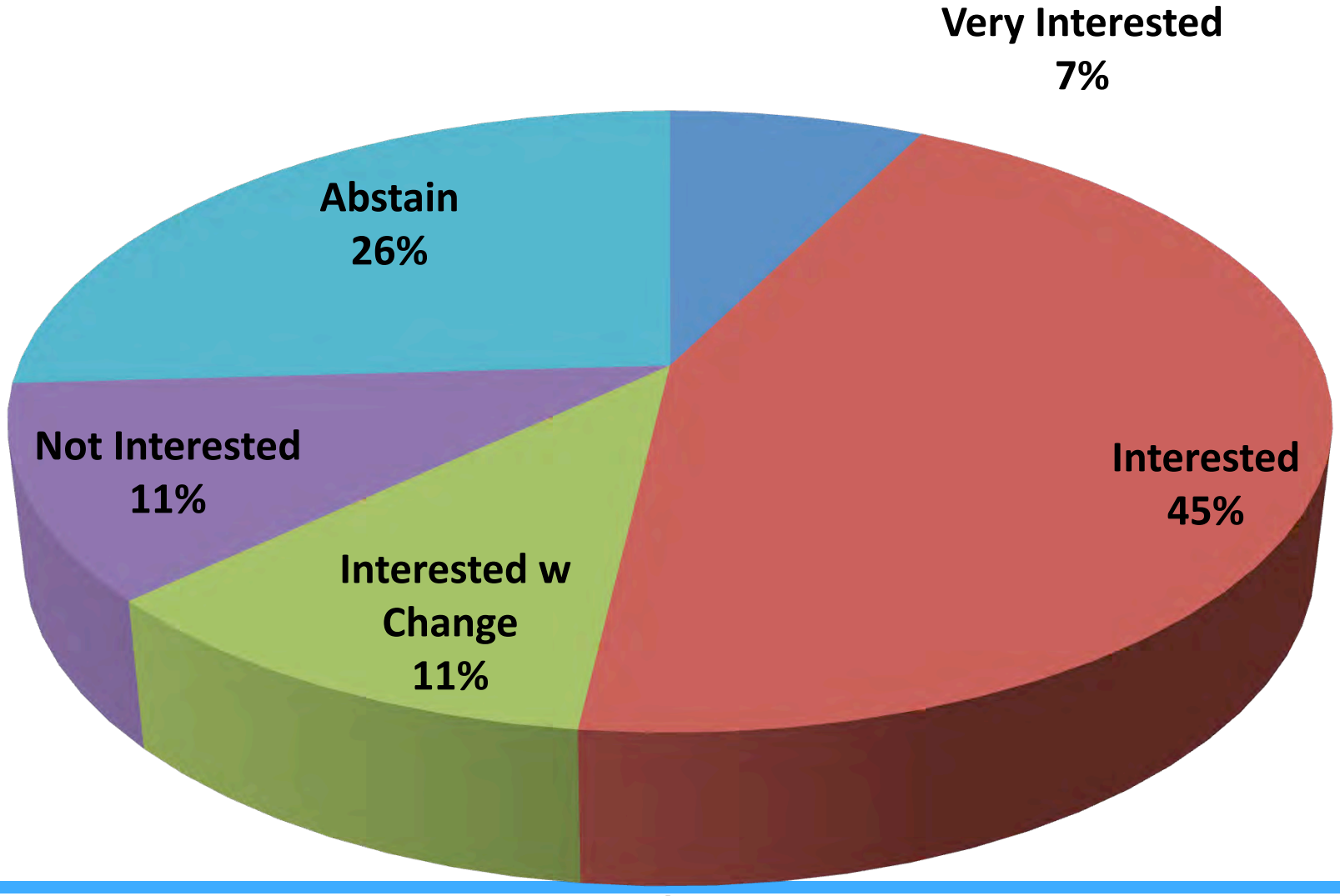
Michael Chin (Columbia University)



- Should look for applicability to biological enzymes encountered in humans (e.g. amylase in saliva)
- Need to broaden the scope – Understand the bio-catalytic interactions between enzymes and other ingredients
- Work like this on interaction between components in formulations is much more relevant to industrial applications than simple model studies
- Need to make it more applied to industry needs vs. theoretical

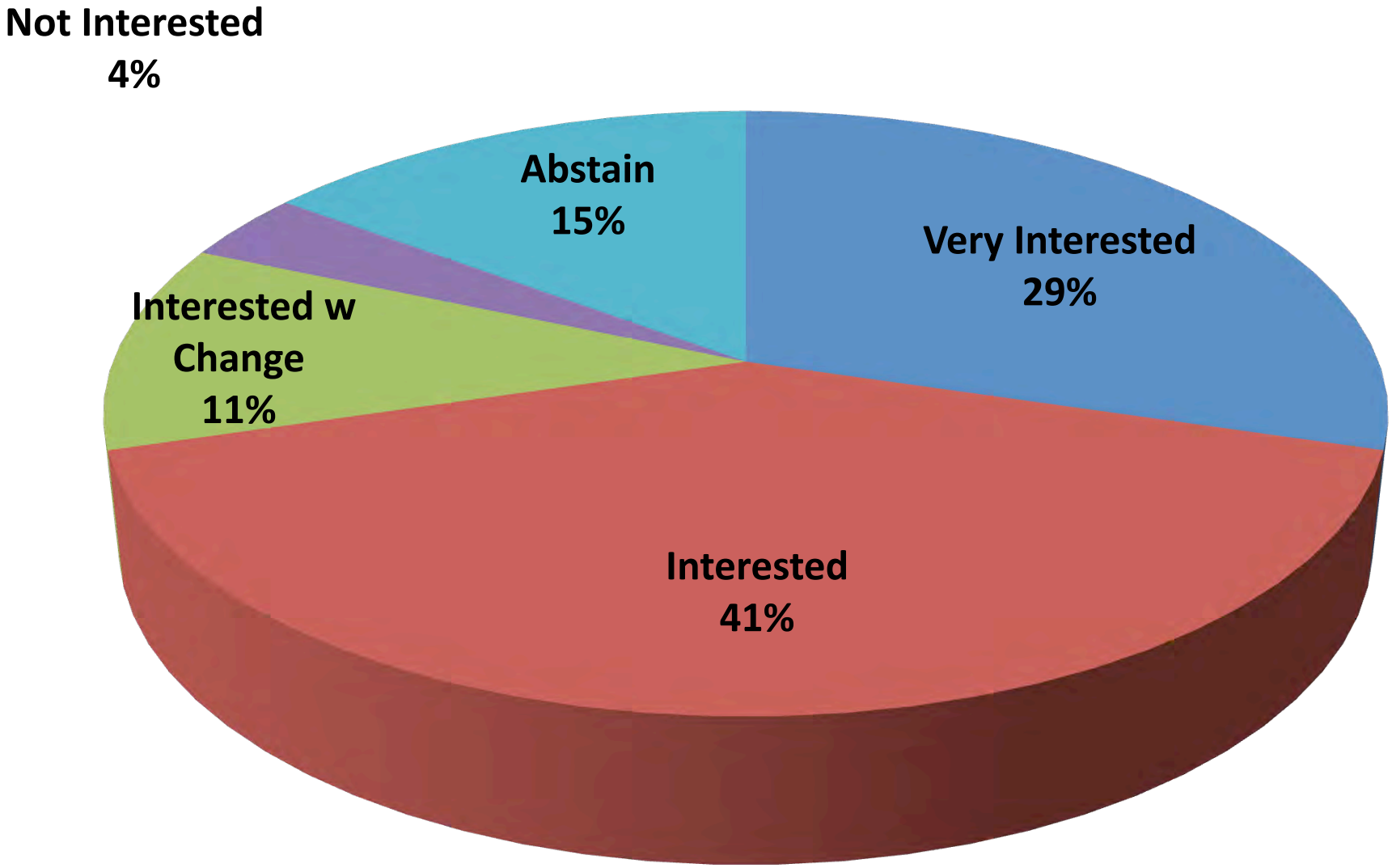
New Methods for the Characterization of Nanoparticles and Correlation with Their Toxicity

Dr. Xiaohua Fang (Columbia University)



- Connection to actual toxicity seemed weak/ Toxicity test needs validation
- How surface tension is related to hydrophobicity is not clear
- Need to explain mechanism(s) behind observed relationships between surface energy and toxicity
- Hydrophobicity can be modified with surface modifications, but does that translate into controlled toxicity?
- What is the effect of ionic strength on such buffered systems?

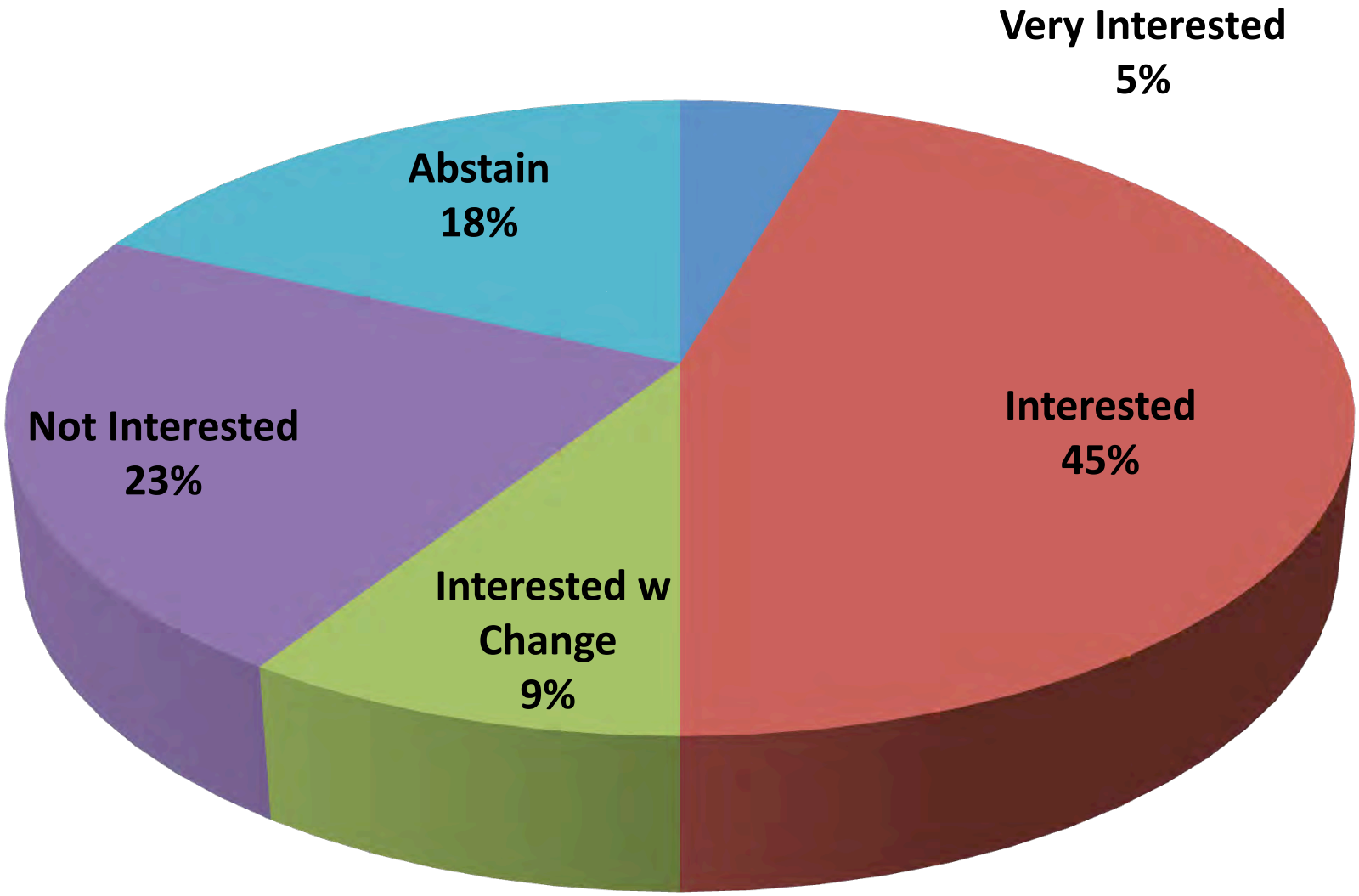
Particle-Process Analytical Technology (P-PAT)
Dr. Kevin Powers (University of Florida)



- Can this be applied to multimodal slurries?
- Would be interested in applications to particle processing (i.e. reduction, milling, etc) and control these types of operations
- Would be interesting to see it on large scale as well as factor in low cost
- Online analysis of emulsions size distribution and of microemulsions is of interest

Dilute Suspension Flow: An Experimental and Modeling Study

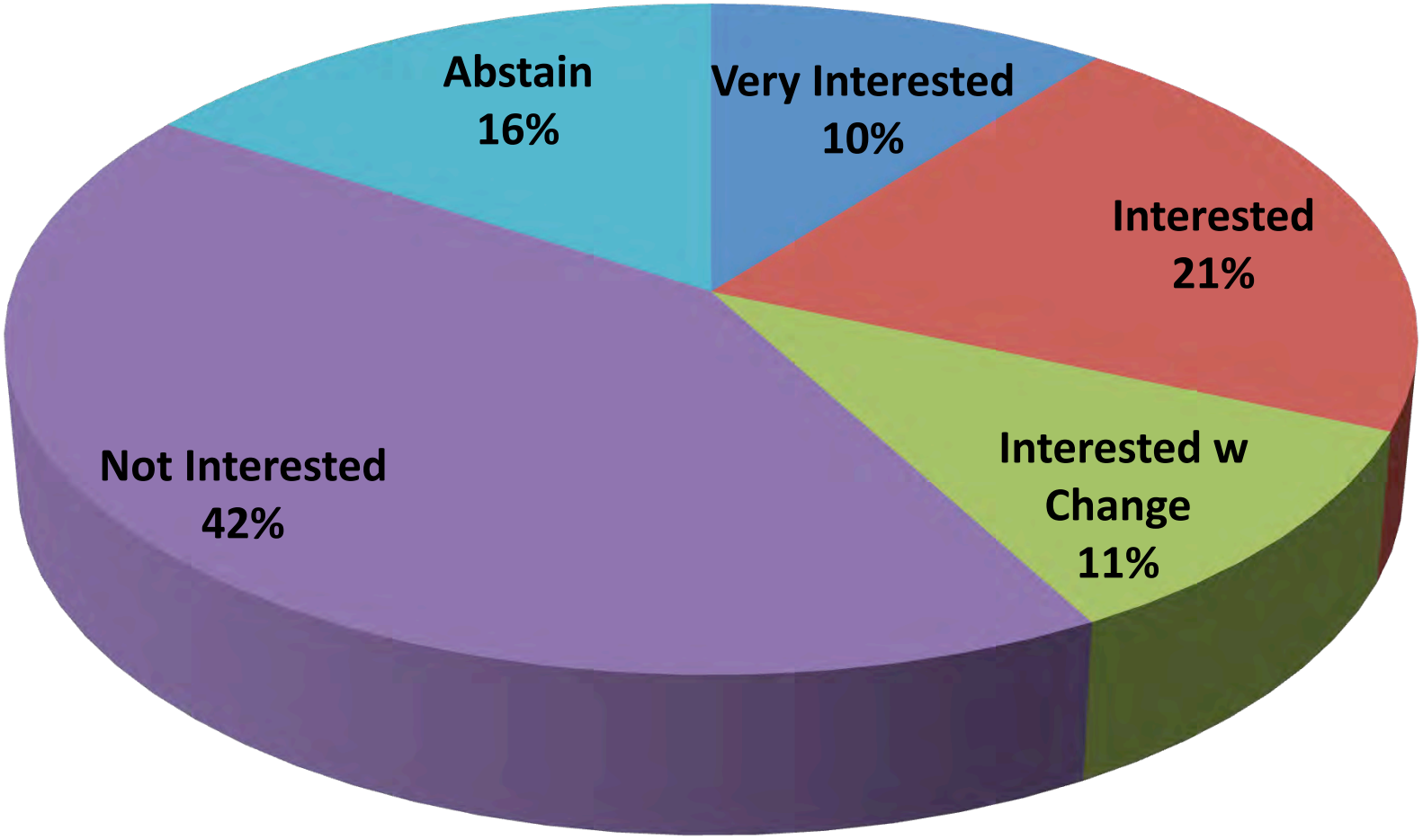
Mark Pepple, Dr. Jennifer Curtis (University of Florida)



- More collaboration with industry suggested
- Interested in more concentrated suspensions (20%-50%, 50%-70%); multicomponent systems
- Interested on behavior in storage tanks with recirculation flow (eductors)

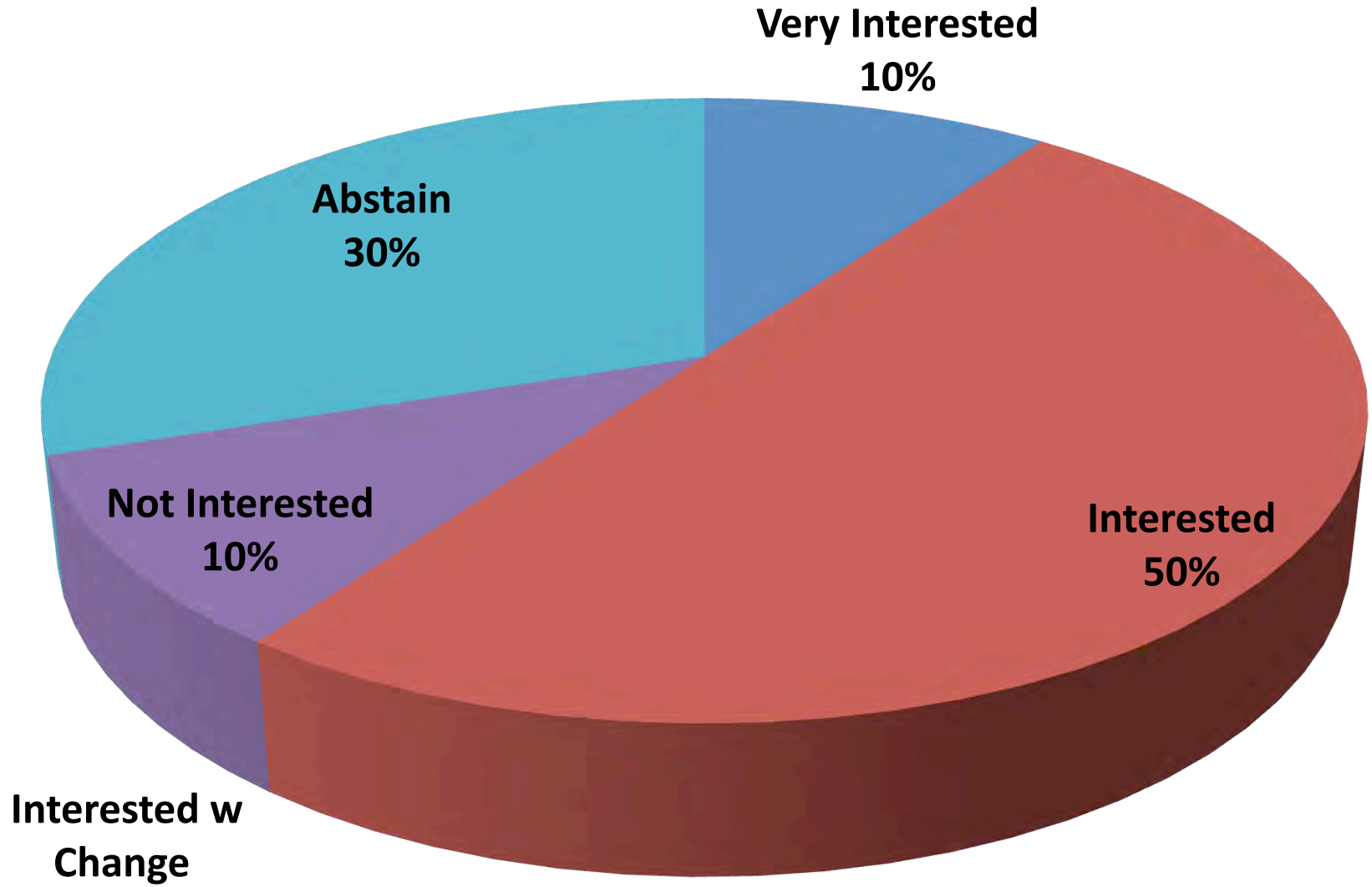
Impact of Fine Silicate Minerals on Rheology, Gas Dispersion and Mineral Separation: Micro-Aggregate - Macro-Network Model

Dr. Partha Patra (Columbia University)



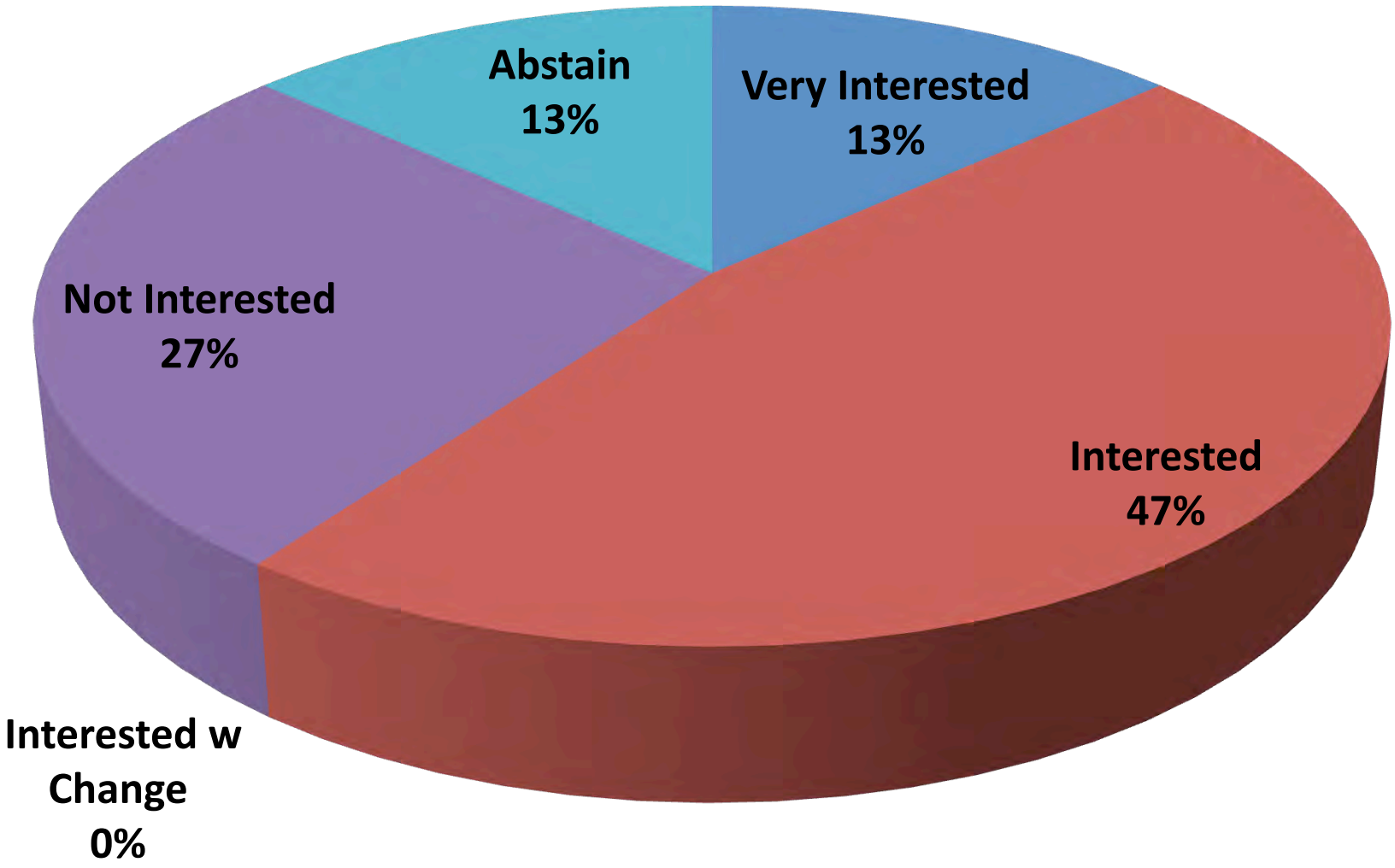
- Consider extending into oil sands processing?
- Very specific to Vale-Inco, what is fundamental here that can be used or relevant to other industries or companies?
- It could spin into the “Dynamic 3 phase frothing/foam” idea suggested by the red team during the working lunch

Fundamental and Applied Studies for Selective Copper/Au/Ag Mineral Separation and Control of Slimes from Altered Silicates
Dr. Murthy Khandrika (Columbia University)



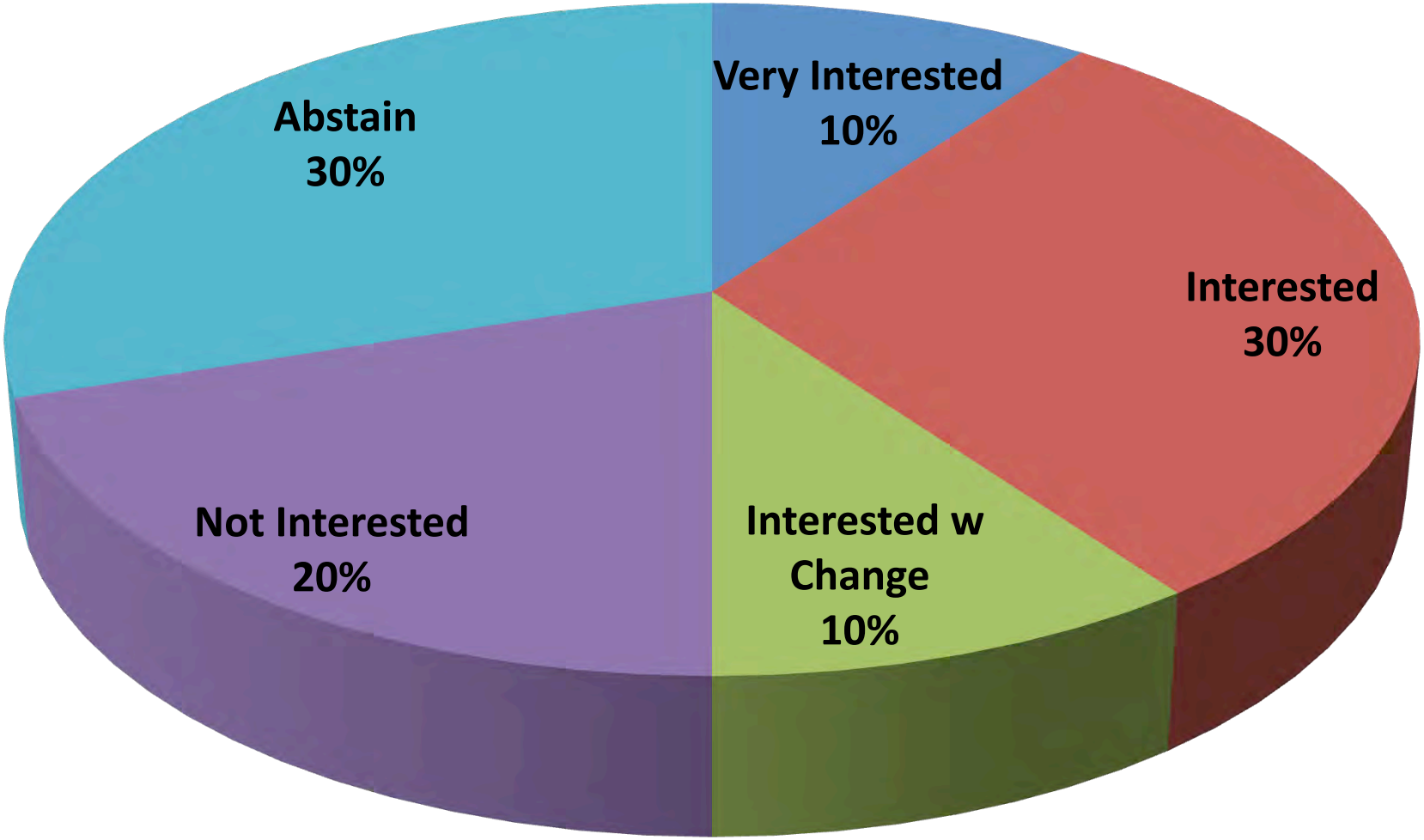
- No comments

Grinding Aids for Nano-Milling using a Stirred Media Mill
Dr. Parvesh Sharma (University of Florida)



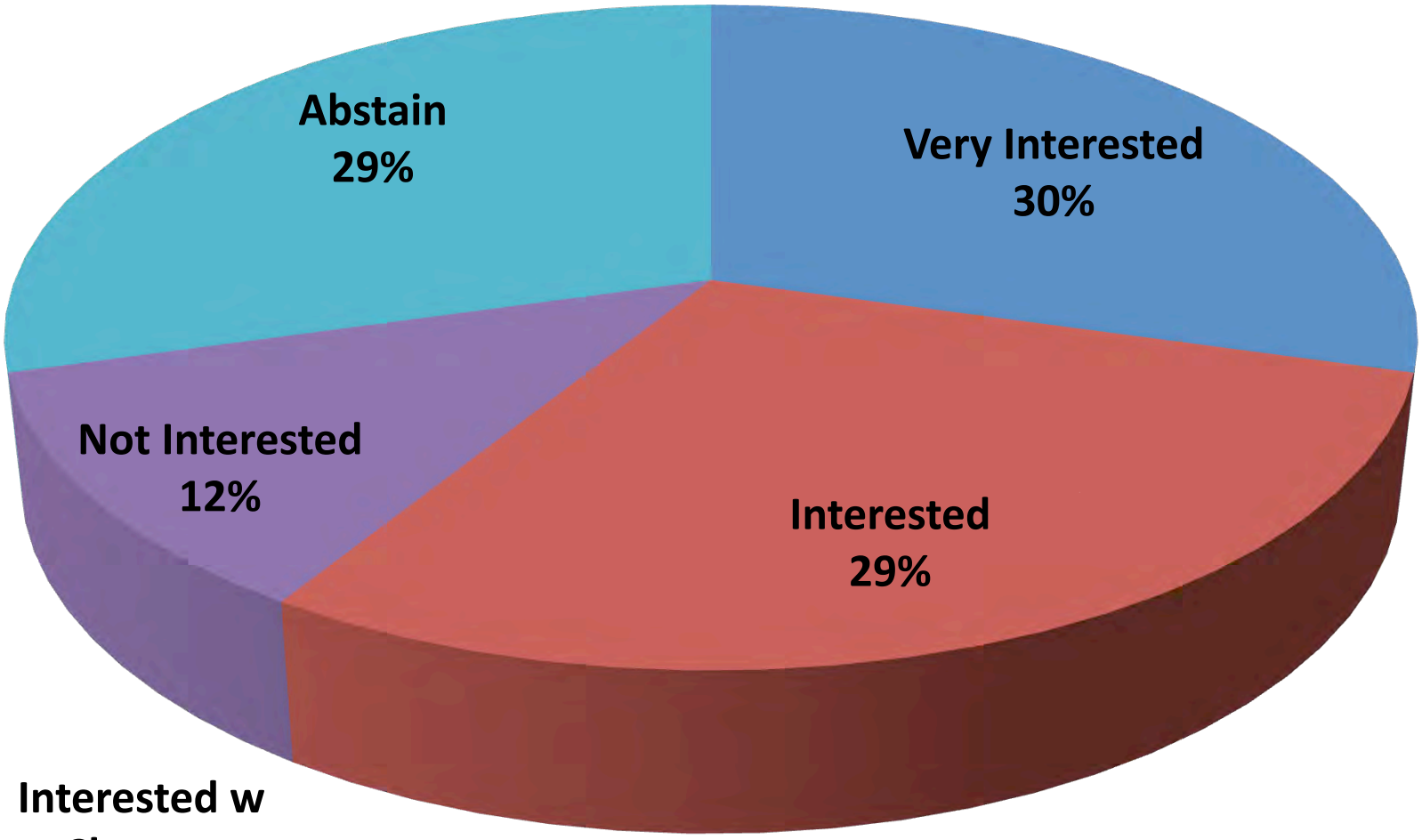
- Use of AFM is a very interesting way to access milling
- Important topic with broad applications; waiting to see work on minerals
- Could be good candidate for “scale up of particle processes”-stirred media milling idea from red group during lunch
- Change on crystal/amorphous structure would be of concern depending on the product

Enhanced Photocatalytic Destruction of Microbes on Surfaces
Dr. Vijay Krishna (University of Florida)



- How do we deliver this economically? Suggest an industry partner peer review to see if we can move faster/further. When will this project be ready for prime time?
- Needs deeper scientific scrutiny & information on species/organism selectivity
- Would need to understand more about activity and specificity of action (i.e. can PHF kill discriminately?)

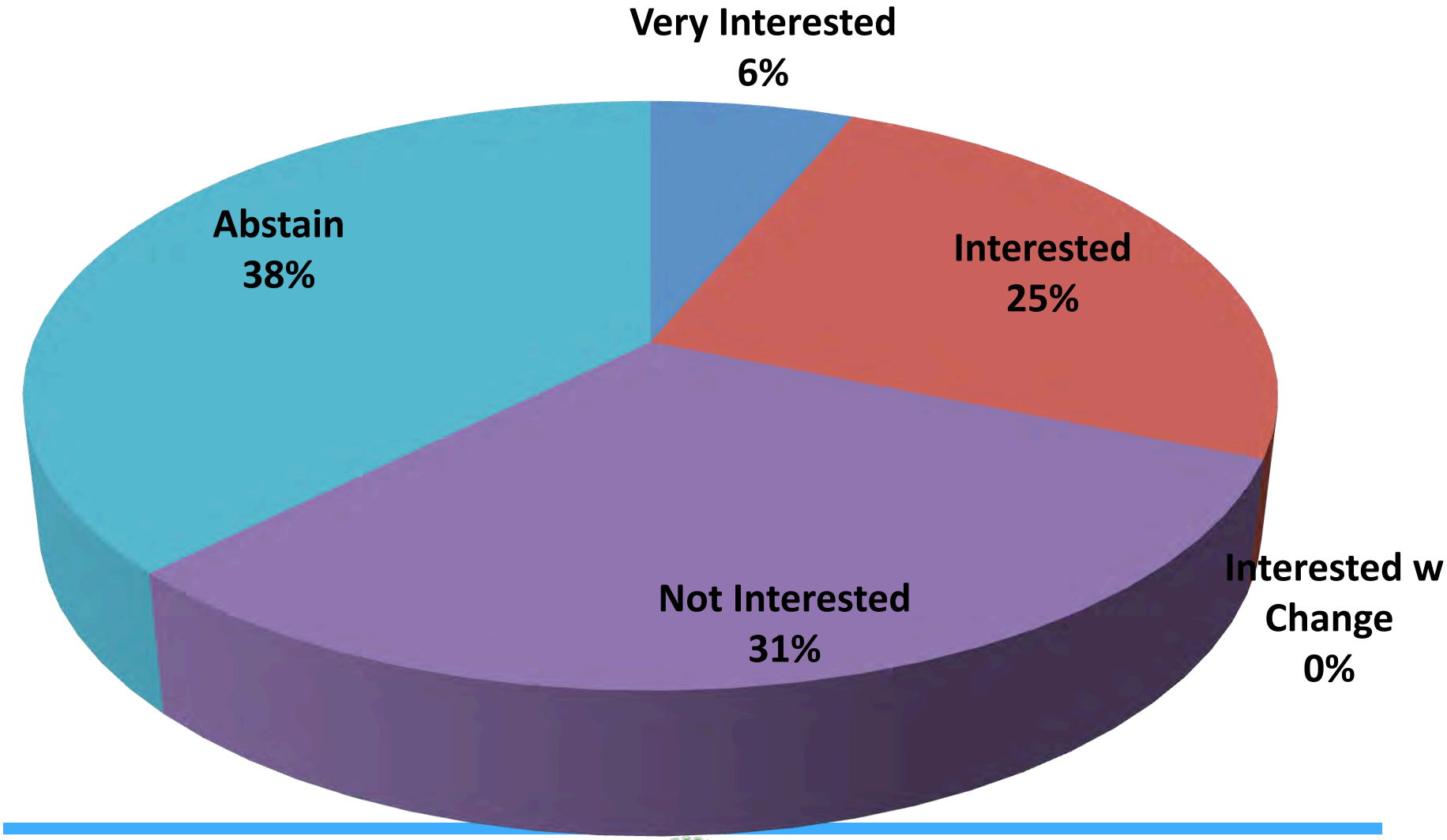
Interactions between Cationic Polymers and Mixtures of Anionic Surfactants: Complex Properties, Phase Diagram and Binding Isotherm
Dr. Bingquan Li, presented by Dr. Parag Purohit (Columbia University)



- Would like to see extension to particle-surfactant-polymer systems
- Looking forward to binding isotherm, phase diagrams for mixed systems (e.g. SLES, ALES and CAPB)
- Are complexes dynamically stable for zeta potential measurements? Do electrolytes disrupt/enhance specific binding effects?
- Should explain binding on context of chemical differences between SO_4^- and COO^- groups

Supplemental Project : A Fundamental Study of Nanoparticle-Protein Mutual Interactions: Role of Nanoparticle Morphology and Size

Dr. Georgios Pyrgiotakis (UF) & Dr. Irina Chernyshova (CU)



- Protein-particle binding is important and generally useful to many companies.
- Would like to see progress next year.

Working Lunch Summary

CPaSS IAB Meeting

February 17-18, 2010

Gainesville, FL

		RED	BLUE	Total
University Researchers	Energy Sustainability	14	4	18
	Honest Criticism – Better Communication	8	1	9
	Glimpse of the Future	3	6	9
	Value of Network	4	5	9
	Funding	2	2	4

		RED	GREEN	Total
Surfactants	Mixed Surfactant Systems / Applied Sciences	15	18	33
	Concentrated multi-component systems – Slurry Dispersions	14	8	22
	Green surfactant – Total Carbon footprint/ biodegradability, toxicity and performance	12	8	20
	High performance systems- surfactants – polymer, particles and enzyme for examples	12	8	20
	Mild Surfactants with low Toxicity/skin field and other synergies	7	6	13

		BLUE	GREEN	Total
Particulates	Energy, water, waste for particulates and surfactants	15	27	42
	Tailing waste management	11	12	23
	Characterization of particle properties and energy materials:	5	16	21
	Suspension/dispersion of micronanoparticles in rheological fluid systems (aqueous, non, aqueous, polymers, etc)	9	5	14
	New materials (particulates) added to core combustion and biomass to concentrate and remove hazardous air pollutants	5	7	12