Program

Biological and Pharmaceutical Complex Fluids II:
Novel Trends in Characterizing Interactions,
Microstructure and Rheology

August 10 – 14, 2014

Durham, North Carolina, USA

Conference Chairs:

Samiul Amin
Malvern Instruments, USA

Tapan Das
Bristol Myers Squibb, USA

Engineering Conferences International
32 Broadway, Suite 314
New York, NY 10004, USA
Phone: 1 - 212 - 514 - 6760, Fax: 1 - 212 - 514 - 6030
www.engconfintl.org – info@engconfintl.org
Washington Duke Inn & Golf Club
3001 Cameron Boulevard Durham, NC 27705
Tel: +1-919-490-0999
Engineering Conferences International (ECI) is a not-for-profit global engineering conferences program, originally established in 1962, that provides opportunities for the exploration of problems and issues of concern to engineers and scientists from many disciplines.

ECI BOARD MEMBERS

Barry C. Buckland, President
  Mike Betenbaugh
  Peter Gray
  Michael King
  Raymond McCabe
  David Robinson
  William Sachs
  Eugene Schaefer
  P. Somasundaran

Chair of ECI Conferences Committee: William Sachs
ECI Technical Liaison for this conference: Herm Bieber

ECI Executive Director: Barbara K. Hickernell
ECI Associate Director: Kevin M. Korpics

©Engineering Conferences International
Scientific Steering Committee

Dr. Jordan Petkov, Unilever R&D, UK

Professor Peter Schurtenberger, Lund University, Sweden

Dr. Steven Hudson, National Institute of Standards and Technology (NIST), USA

Professor Christopher Roberts, University of Delaware, USA

Professor John Carpenter, Co-Director of the Center for Pharmaceutical Biotechnology, University of Colorado School of Pharmacy, USA

Dr. Mary Cromwell, Director and Senior Scientist, Late Stage Pharmaceutical Development Department, Genentech, USA

Professor Christopher Daubert, Head: Food, Bioprocessing and Nutrition Sciences, North Carolina State University, North Carolina, USA

Professor Yatin Gokarn, Institute of Chemical Technology (Mumbai), India
Conference Sponsors

Formulaction US
Malvern Instruments
Merck and Co., Inc.
Molmex Scientific Inc.
Optofluidics Inc.
ProteinSimple
RheoSense, Inc.
Sunday, August 10, 2014

15:00 – 16:20   Conference Check-in (Presidents Gallery)
16:20 –   Welcome and Introductory Remarks

**Protein interactions, phase behavior and stability**
Chair: Tapan Das, Bristol Myers Squibb, USA

16:30 – 16:55   Protein Interactions, stability, and aggregation mechanisms from low to high concentrations
Christopher Roberts, University of Delaware, USA

16:55 – 17:20   Gauging colloidal and thermal stability in human IgG1 – sugar solutions through diffusivity measurement
Andreas S. Bommarius, Georgia Institute of Technology, USA

17:20 – 17:45   Characterizing protein-protein interactions in solution
John van Zanten, BTEC-North Carolina State University, USA

17:45 – 18:10   Characterizing phase behavior of highly concentrated protein solutions by dynamic light scattering
Katharina Christin Bauer, Karlsruhe Institute of Technology, Germany

18:30 – 20:00   Opening reception with heavy hors d’oeuvres and social hour (Presidents Terrace)

**Notes**

- *Technical sessions will be in Presidents I.*
- *Poster Sessions and exhibit tables will be in the Presidents Gallery.*
- *Meals will be in the Presidents II.*
- *Audiotaping, videotaping and photography of presentations are prohibited.*
- *Speakers – Please have your presentation loaded onto the conference computer prior to the session start (preferably the day before).*
- *Speakers – Please leave at least 5 minutes for questions and discussion.*
- *Please do not smoke at any conference functions.*
- *Turn your cellular telephones to vibrate or off during technical sessions.*
- *Be sure to check your contact information on the Participant List in this program and make any corrections to your name/contact information online. A corrected copy will be sent to all participants after the conference.*
Monday, August 11, 2014

07:30 – 08:30  Breakfast

**Protein aggregation, dynamics, cluster formation and characterization I**
Chair: Christopher Roberts, University of Delaware, USA

08:35 – 09:00  Spontaneous formation of oligomers and fibrils in large scale molecular dynamics simulations of peptides
Carol Hall, North Carolina State University, USA

09:00 – 09:25  On the large scale functional dynamics of proteins in solution
Dieter Richter, Jülich Centre for Neutron Science, Germany

09:25 – 09:50  Exploring dynamics in concentrated protein solutions
Anna Stradner, Lund University, Sweden

09:50 – 10:15  Structural investigation of protein and peptide fibrillation, using solution SAXS analysis as a central method
Bente Vestergaard, University of Copenhagen, Denmark

10:15 – 10:50  Coffee/Tea Break

**Protein aggregation, dynamics, cluster formation and characterization II**
Chair: Peter Schurtenberger, Lund University, Sweden

10:50 – 11:15  Reversible cluster formation in concentrated monoclonal antibody solutions
Yun Liu, NIST, USA

11:15 – 11:40  Characterization of dynamic clusters of mAbs using high shear rheology, small angle scattering and neutron spin echo
Isidro (Dan) Zarraga, Genentech, USA

11:40 – 12:05  X-Ray and neutron scattering to study monoclonal antibodies in various phases
Nicholas Clark, NIST, USA

12:05 – 12:30  Kinetic analysis of therapeutic protein aggregation from low to high protein concentration
Lucrèce Nicoud, ETHZ, Switzerland

12:30 – 12:55  Physicochemical attributes and colloidal properties of dimeric and monomeric albumin
Michael Marlow, Regeneron, USA

13:00 – 14:30  Lunch

14:30 – 15:30  *ad hoc* discussions/free time

15:30 – 16:00  Afternoon Coffee/Tea
Monday, August 11, 2014 (continued)

Emerging techniques: Protein aggregation, aggregate characterization, formulation, stability
Chair: Isidro Zarraga, Genentech, USA

16:00 – 16:25
High resolution mass spectrometric monitoring of early aggregates
Elizabeth Topp, Purdue University, USA

16:25 – 16:50
Automated chemical denaturation as a tool to evaluate protein stability and optimize the formulation of biologics
Ernesto Freire, Johns Hopkins University, USA

16:50 – 17:15
Combining dynamic light scattering and Raman spectroscopy to achieve new insights into the measurement of protein stability, aggregation and high order structure
Neil Lewis, Malvern Instruments, USA

17:15 – 17:40
Accurate counting of protein particles
Dean Ripple, NIST, USA

17:40 – 18:05
Image is everything: Sub-visible particle characterization of biopharmaceutical
Angelica Olcott, ProteinSimple, USA

18:30 – 20:00
Dinner

20:00 – 21:00
Poster Session & Exhibition (Oral Introduction-4 minutes/poster)

21:00 – 22:00
Poster Session, Exhibition and Social Hour
Tuesday, August 12, 2014

07:30 – 08:30  Breakfast

**Proteins & biological complex fluids in foods**  
Chair: Saad Khan, North Carolina State University, USA

09:00 – 09:25  Protein-based structures in foods: Factors determining texture and satiety  
Allen Foegeding, North Carolina State University, USA

09:25 – 09:50  Stress-temperature limits for structuring of casein concentrates  
Balz Baehler, University of Hohenheim, Germany

09:50 – 10:15  Soft matter science and modern approaches for the food industry  
Deniz Gunes, Nestle, Switzerland

10:15 – 10:50  Coffee/Tea Break

**Protein surface interactions and interfacial properties**  
Chair: Orlin Velev, North Carolina State University, USA

10:50 – 11:15  Dynamics of complex interfaces: protein-laden and bacteria-laden interfaces  
Kathleen Stebe, University of Pennsylvania, USA

11:15 – 11:40  Buckling phenomena and particle formation at the interface between air and monoclonal antibody  
Gerry Fuller, Stanford University, USA

11:40 – 12:05  Effect of shear and surface on aggregation of protein  
Indu Sharma, IIT-Delhi, India

12:05 – 12:30  Solid-liquid interfacial shear as a source of antibody aggregation in bioprocessing  
Daniel Bracewell, University College London, United Kingdom

12:30 – 14:00  Lunch

14:00 – 15:30  Discussions with Exhibitors

15:30 – 16:00  Afternoon Coffee/Tea

**Emerging techniques: Proteins and biological complex fluids**  
Chair: Kathleen Stebe, University of Pennsylvania, USA

16:00 – 16:25  Active and passive measurements of local properties of complex fluids using low-coherence dynamic light scattering  
Aristide Dogariu, University of Central Florida, USA

16:25 – 16:50  Nanoparticle analysis using optofluidic and nanotweezer technology  
David Erickson, Cornell University, USA

16:50 – 17:15  Real time determination of surface charge in microfluidic channels to investigate surface adsorption of proteins  
Julio Alvarez, Virginia Commonwealth University, USA
Tuesday August 12, 2014 (continued)

17:15 – 17:40  Characterization of protein surface adsorption by quartz crystal microbalance with dissipation (QCM-D)
Sambit Kar, Bristol Myers Squibb, USA

17:40 – 18:05  Surface enhanced Raman spectroscopy sensing of chemical and biological molecules on low-cost microporous device
Ian White, University of Maryland, USA

18:05 – 18:30  Mass spectrometry-based proteomics strategy for protein-ligand binding analysis in complex biological mixtures
Michael Fitzgerald, Duke University, USA

Free evening / Dinner on your own
Wednesday, August 13, 2014

07:30 – 08:30
Breakfast

Protein and peptide self association and aggregation
Chair: Anna Stradner, Lund University, Sweden

09:00 – 09:25
Peptide aggregation reduces the bioactivity of the HIV selective-inhibitor peptide D-Ala-Peptide-T amide (DAPTA)
Cait Macphee, University of Edinburgh, United Kingdom

09:25 – 09:50
Self-assembly kinetics and mechanism of the amphiphilic peptide RADA 16-I
Marta Owczarz, ETHZ, Switzerland

09:50 – 10:15
Investigating the influence of glycerol, PEG 1000 and glycine on the phase behavior of lysozyme and their impact on the stability of the native conformational state
Lara Galm, Karlsruhe Institute of Technology, Germany

10:15 – 10:50
Coffee/Tea Break

Rheology and dynamics: Proteins and biological complex fluids
Chair: Daniel Blair, Georgetown University, USA

10:50 – 11:15
Microrheology of protein solution
Eric Furst, University of Delaware, USA

11:15 – 11:40
How molecular conformation and clustering impact the concentration dependence of viscosity of protein solution
Prasad Sarangapani, Medimmune, USA

11:40 – 12:05
Thermal denaturation of proteins leading to protein gels; reversible verses irreversible denaturation and microstructural properties of the gels
Alice Blumlein, National University of Ireland, Ireland

12:05 – 12:30
Characterization and prediction of protein phase behavior by means of squeeze flow rheometry
Marie-Therese Schermeyer, Karlsruhe Institute of Technology, Germany

12:30 – 12:55
Rheology and fizzics of protein-surfactant mixtures
Vivek Sharma, University of Illinois, USA

13:00 – 15:30
Free afternoon / Lunch on your own

15:30 – 16:00
Afternoon Coffee/Tea

Rheology and dynamics: Complex fluids and colloids
Chair: Samiul Amin, Malvern Instruments, USA

16:00 – 16:25
Confocal-rheology of biologically derived materials: connecting microstructure to mechanical properties
Daniel Blair, Georgetown University, USA
<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Speaker Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>16:25 – 16:50</td>
<td>Gelation by molecular self-assembly: Can we understand it and can we predict it?</td>
<td>Srini Raghavan, University of Maryland, USA</td>
</tr>
<tr>
<td>16:50 – 17:15</td>
<td>Photo-activated gelation of alginate hydrogels: Real-time in situ rheology &amp; evolution of microstructure</td>
<td>Saad Khan, North Carolina State University, USA</td>
</tr>
<tr>
<td>17:15 – 17:40</td>
<td>Passive optical mapping of the phase transitions in triblock copolymer systems</td>
<td>Jose R Guzman-Sepulveda, University of Central Florida, USA</td>
</tr>
<tr>
<td>17:40 – 18:05</td>
<td>Dynamics of cubic colloids</td>
<td>John Royer, NIST, USA</td>
</tr>
<tr>
<td>18:35 – 20:30</td>
<td>Conference Dinner</td>
<td></td>
</tr>
<tr>
<td>20:30 – 21:30</td>
<td>Poster Session and Social Hour</td>
<td></td>
</tr>
</tbody>
</table>
Thursday, August 14, 2014

07:30 – 08:30 Breakfast

Protein interactions with nanoparticles, surfactants and bionanotechnology
Chair: Eric Furst, University of Delaware, USA

09:00 – 09:25 Bio-inspired multifunctional nanomaterials for highly-efficient drug/gene delivery
Zhongwei Gu, National Engineering Research Center for Biomaterials, China

09:25 – 09:50 Engineering of bio-colloidal interactions for development of novel antibacterial and antiviral formulations
Orlin Velev, North Carolina State University, USA

09:50 – 10:15 New insight into the characterization of protein-nanoparticle interactions
Marc Obiols-Rabasa, Lund University, Sweden

10:15 – 10:30 Biocompatible composite hydrogels laden with crystalline active pharmaceutical ingredients of controlled size and loading
Huseyin Burak Eral, Massachusetts Institute of Technology, USA

10:30 – 10:45 Conference Close - Samiul Amin and Tapan Das (Co-Chairs)

10:45 – 11:15 Coffee/Tea Break

Departures
**Biological and Pharmaceutical Complex Fluids II: Novel Trends in Characterizing Interactions, Microstructure and Rheology**

**Poster List**

1. **A comparison study of manual and automated particle characterization using Micro-Flow Imaging (MFI)**  
   Angelica Olcott, ProteinSimple, USA

2. **Assessment of surfactants for efficient droplet PCR using the pendant drop technique**  
   Kunal R. Pandit, University of Maryland College Park, USA

3. **Viscosity of colloidal and protein clustered solutions**  
   P. Douglas Godfrin, University of Delaware, USA

4. **Automated, low volume viscosity and size measurements via micro-capillary Viscometry**  
   Wei Qi, Malvern Instruments, USA

5. **Competition between isotropic and directional interactions in a toy model of protein solutions**  
   Debra J. Audus, National Institutes of Standards and Technology (NIST), USA

6. **Characterization of the conformational ensembles of humanized IgG1, IgG2 and IgG4 in solution**  
   Bente Vestergaard, University of Copenhagen, Denmark

7. **Investigation of surfactant-cell interactions for increased efficiency of commercial bioreactors**  
   David Chang, North Carolina State University, USA

8. **Characterization and control of surfactant and copper-mediated norovirus interactions**  
   Brittany S. Mertens, North Carolina State University, USA

9. **Microrheology of therapeutic protein solutions**  
   Lilian Lam Josephson, University of Delaware, USA

10. **Identification and surface characterization of nanoparticles**  
    Abbey Weith, Optofluidics, Inc., USA

11. **Simultaneous DLS and Raman scattering as a complementary technique to monitor protein aggregation**  
    Gregory V. Barnett, University of Delaware, USA

12. **Gel point determination thanks to microrheology**  
    Jonathan Denis, Formulaction Inc., USA

13. **Physical stability of nanoparticle dispersions**  
    Jonathan Denis, Formulaction Inc., USA