

# BIOT

## DIVISION OF BIOCHEMICAL TECHNOLOGY

Final Program, 236th ACS National Meeting, Philadelphia, PA, August 17-21, 2008

R. Srivastava, A. S. Rathore, and A. Velayudhan, *Program Chairs*

### SUNDAY MORNING

Section A

Philadelphia Marriott -- Grand Blrm Salon K

#### Upstream Processing: Advances in Cell Culture Process Development

*Cosponsored by HEALTH*

S. W. Harcum and J. Sridhar, *Organizers*

**8:30** —1. Investigation of the use of FACS in cell line development. **D. Krishna**, A. Taylor

**8:55** —2. Head-to-head comparison of production and quality data for Mabs produced in Hyclone 250L single-use-bioreactors vs. traditional cell culture bioreactors. **T. Hudson**, T. Allotta, T. Myint, D. Giandomenico

**9:20** — Intermission.

**9:40** —3. High-throughput experimentation and analytics to determine impact of serum variation on vaccine production. **A. Grippe**, S. Srikanth, A. Kohli, M. Ly, B. Dickinson, G. Maheshwari, S. Subramaniam

**10:05** —4. Scale-down challenges for microcarrier-based cell culture processes. **T. Johnson**, J. L. Barker, J. M. Keegan, D. St. Laurent, C. W. Buser, K. Konstantinov

**10:30** —5. Twenty-four-well miniature bioreactor system as a scale-down model for cell culture process development. **A. Chen**, R. Chitta, D. Chang, A. Amanullah

Section B

Philadelphia Marriott -- Franklin 8

#### Biophysical & Biomolecular Symposium: Protein Engineering

*Cosponsored by HEALTH*

A. Lugovskoy and D. W. Wood, *Organizers*

**8:30** —6. Analysis and optimization of protein stability and function with combinatorial libraries. **S. S. Sidhu**

**9:10 —7.** Creation of a type IIS restriction endonuclease with a long recognition sequence. **S. M. Lippow**, P. M. Aha, M. H. Parker, W. J. Blake, B. M. Baynes, D. Lipovsek

**9:30 —8.** Altering effector specificity in an engineered protein switch by a combination of computational design and directed evolution. **R. A. Heins**, J. R. Kim, L. L. Looger, T. Soka, M. Ostermeier

**9:50 —9.** Structure prediction of domain insertion proteins from structures of the individual domains. **M. Berrondo**, M. Ostermeier, J. J. Gray

**10:10 —** Intermission.

**10:25 —10.** Cell-free protein synthesis of complex proteins and protein assemblies containing posttranslational modification. **A. R. Goerke**, J. J. Wu, W. Ebina, B. C. Bundy, J. R. Swartz

**10:45 —11.** Hydrogel forming enzymes: Bifunctional proteins with enzymatic and cross-linking functionalities. **I. Wheeldon**, S. Banta

**11:05 —12.** AraC regulatory protein mutants with altered effector specificity. S -Y. Tang, H. Fazelinia, C. D. Maranas, **P. C. Cirino**

Section C

Philadelphia Marriott -- Grand Blrm Salon H

### **Downstream Processing: Advances in Chromatography**

M. R. Etzel and A. Kundu, *Organizers*

**8:30 —13.** Model assisted scale up of industrial purification processes: of mechanistic models and PCA approaches. **J. Thömmes**, J. Ganguli, J. T. McCue

**9:10 —14.** Controlling pH transitions and conductivity transients in weak cation exchange resins. **J. L. Fogle**, J. Hsiung

**9:30 —15.** Effect of small defects on performance of anion exchange membrane adsorbers. **N. Parikh**, N. Fontes, R. Van Reis, A. Mehta

**9:50 —** Intermission.

**10:05 —16.** Impact of protein exclusion on the performance of ion exchange resins. **J. W. Zeid**, C. Harinarayan, R. Van Reis

**10:25 —17.** Investigating protein binding interactions in cation exchange and multimodal chromatographic systems. **W. K. Chung**, A. S. Freed, Y. Hou, S. Dekat, S. A. McCallum, K. V. Lakshmi, G. Makhatadze, S. M. Cramer

**10:45 —18.** Protein interactions with self-assembled monolayers presenting multimodal ligands: A surface

plasmon resonance study. **S. Vutukuru**, S. R. Bethi, R. S. Kane

**11:05 –19.** Study of hydrophobic interaction based binding of IgG and its fragments on hydrophilized polyvinylidene fluoride membrane. **R. Ghosh**, X. Sun, D. Yu

Section D

Philadelphia Marriott -- Grand Blrm Salon L

### **Quality By Design: Process Analytical Technology**

*Cosponsored by HEALTH*

M. V. Koch and M. Molony, *Organizers*

**8:30 –20.** Quality by Design: The facts vs. fantasy. **A. Mire-Sluis**

**9:10 –21.** Implementation of Quality by Design for biopharmaceuticals: Approach, case studies and integration with PAT. **A. Rathore**, A. Sharma, S. Dermawan

**9:30 –22.** Mining cell culture process data to unveil high productivity characteristics. **S. Charaniya**, H. Rangwala, K. Mills, K. Johnson, G. Karypis, W -S. Hu

**9:50 –** Intermission.

**10:05 –23.** Application of process analytical technology (PAT) toward bioprocessing. **A. Sharma**, M. Yu, A. S. Rathore, S. Yeboah

**10:25 –24.** Data-mining fed-batch bioreactor data using multivariate data analysis tools. **N. Vijayasankaran**, F. Li, J. Li, B. Figueroa, D. Stevenson, T. Ryll, D. Chang

**10:45 –25.** On-line monitoring of mammalian cell cultures. **G. E. Derfus**, D. Abramzon, M. Tung, R. Kiss, A. Amanullah

**11:05 –26.** Application of turbidity measurement as a correlate of cell lysis in a live virus vaccine production process. **J. Warren**, T. Shah, A. Druckenmiller, F. Lu, C. Myint, N. Sosale, G. Maheshwari

Section E

Philadelphia Marriott -- Grand Blrm Salon I/J

### **Biophysical & Biomolecular Symposium: Current Challenges In Protein Formulations**

*Cosponsored by HEALTH*

S. Hershenson and T. W. Randolph, *Organizers*

**8:30 –27.** Formulation sweet spots: Lessons learned from development of protein pharmaceuticals. **B. S. Chang**, J. Paroski, D. Kim, A. Khachatouri

**8:50 —28.** Opalescence of an IgG1 monoclonal antibody is mediated by ionic strength and excipients. N. Wang, B. Hu, H. Mach, R. M. Ionescu, M. Kirchmeier, **B. K. Meyer**

**9:10 —29.** Opalescence in antibody formulations is a solution critical phenomenon. **M. E. M. Cromwell**, J. F. Carpenter, T. Scherer, T. W. Randolph

**9:30 —30.** Effect of ions on the agitation and temperature-induced aggregation reactions of antibodies. R. M. Fesinmeyer, S. Paterson, A. Saluja, S. Brych, E. Kras, D. N. Brems, **Y. R. Gokarn**

**9:50 —** Intermission.

**10:05 —31.** Modulation of aggregation by nonpolar amino acids in liquid formulations for monoclonal antibodies. **R. S. Rajan**, A. M. Lueras, J. Abel, A. Saluja, C. Kolvenbach, L. Peabody, H. Hultgen, H. Gadgil, T. Li

**10:25 —32.** Buffer-dependent fragmentation of a humanized full-length monoclonal antibody. **B. Salinas**, H. A. Sathish, J. F. Carpenter, T. W. Randolph

**10:45 —33.** Formulation strategy to decrease aspartic acid isomerization in a monoclonal antibody. **T. E. Swartz**, D. Nelson, M. Nguyen, A. Adriano, Y. Wang, J. Ouyang, B. Kabakoff

**11:05 —34.** Assessing SE-HPLC chromatographic profiles in method development for stable protein formulations. J. Litowski, L. Karamujic, **V. Dharmavaram**, G. Ratnaswamy

## SUNDAY AFTERNOON

Section A

Philadelphia Marriott -- Grand Blrm Salon K

### Upstream Processing: Advances in Cell Culture Process Development

*Cosponsored by HEALTH*

S. W. Harcum and J. Sridhar, *Organizers*

**1:30 —35.** Probing the transitions in metabolic states using transcriptome, kinetic and metabolite analysis. **B. C. Mulukutla**, K. F. Wlaschin, M. Gramer, W -S. Hu

**1:55 —36.** Cell culture development for implementation of an animal component-free process. **J. L. Autsen**, W -L. P. Tsai, T. Allotta, J. H. Chou

**2:20 —37.** Development of potent chemically-defined medium for CHO-based fed-batch processes. **Y -M. Huang**, W. Hu, E. Rustandi, H. Yusuf-Makagiansar, T. Ryll

**2:45 —** Intermission.

**3:05 —38.** Recombinant protein productivity dependence on cell cycle, stress response and shear stress. **C. Berdugo**, J. J. Chalmers, I. Blumentals, O. Lara-Velasco

**3:30 —39.** Sequential addition of glutamine and alternative substitutes to reduce ammonium production while maintaining t-PA productivity. **D. Y. Kim**, M. A. Jardon, M. A. Chaudhry, J. M. Piret

Section B

Philadelphia Marriott -- Grand Blrm Salon I/J

### **Biophysical & Biomolecular Symposium: Protein Engineering**

*Cosponsored by HEALTH*

A. Lugovskoy and D. W. Wood, *Organizers*

**1:30 —40.** FRET 2.0 sensor design based on improved conformational switching. **M. Golynskiy**, M. Merkx, E. Meijer

**1:55 —41.** Directed co-evolution of the Tat export machinery for use in biotechnology applications. **M. J. Marrichi**, M. P. DeLisa

**2:20 —42.** Development of soluble DO11.10 T cell receptor for therapeutic applications. **J. Maynard**, B. Roy, R. Myhre, R. Gonzales

**2:45 —** Intermission.

**3:05 —43.** Simple recombinant design of IgG-based bispecific antibodies. **K. J. Davis**, K. D. Wittrup

**3:30 —44.** Engineering enzymatically activated targeting ligands using bacterial peptide display libraries. **J. M. Thomas**, S. Kenrick, P. S. Daugherty

**3:55 —45.** Cystine knot polypeptides engineered for high affinity integrin binding: A new class of in vivo molecular imaging agents. R. H. Kimura, A. M. Levin, Z. Cheng, S. S. Gambhir, **J. R. Cochran**

Section B

Philadelphia Marriott -- Grand Blrm Salon I/J

### **Perlman Lecture**

*Cosponsored by HEALTH*

W. Zhou, *Organizer*

**5:00 —46.** The trials and tribulations of a medical breakthrough: The discovery and development of Carvedilol (Coreg) for the treatment of congestive heart failure. **R. Ruffolo**

Section C

Philadelphia Marriott -- Grand Blrm Salon H

### **Downstream Processing: Advances in Chromatography**

M. R. Etzel and A. Kundu, *Organizers*

**1:30 —47.** Impact of hydrophobic interaction chromatography operating parameters on peak position, peak shape and purity. **V. F. Reynolds**

**1:50 —48.** Examining the effect of protein size on transport and adsorption in polymer-modified ion-exchange media. **B. D. Bowes**, A. M. Lenhoff

**2:10 —49.** Mechanisms for Protein A resin binding capacity decay and solutions for resin lifetime improvement. **C. Jiang**, J. Liu, S. S. Lee, A. A. Shukla

**2:30 —50.** Evaluation of ProSep Ultra Plus® Protein A affinity media for mAb downstream process. **V. Chai**, T. Hong, J. Zhou

**2:50 —** Intermission.

**3:05 —51.** Design of high performance Protein A chromatography resins for antibody processing. **N. Soice**, J. Umana, K. Cotoni, L. Gottlieb, J. Hamzik, C. Wang, N. Bian, S. Ramaswamy, S. Spector, Y. Wong, K. Beyzavi, K. Cheng

**3:25 —52.** Development of a downstream process for a monoclonal antibody. **K. Eriksson**

**3:45 —53.** Case study: Using DOE to define operating range of Capto™ adhere in mAb purification in flowthrough mode. **J. L. Lee**, X. Zhao, T. Hong, J. Zhou

**4:05 —54.** Rational development of Cleaning-in-Place protocols for affinity media. **H. J. Johansson**, H. Tenglidén, A. Grönberg

Section D

Philadelphia Marriott -- Grand Blrm Salon L

### **Quality By Design: Design Space - Downstream**

*Cosponsored by HEALTH*

B. Kelley, Q. Chen, and K. Barnthouse, *Organizers*

**1:30 —55.** Robustness of retroviral clearance by capture protein A chromatography. M. Zhang, S. Lute, L. Norling, D. Korbe, K. Padua, G. Blank, Q. Chen, **K. Brorson**

**1:50 —56.** Application of Quality by Design to retrovirus inactivation by detergent treatment. **J. Nolting**, B. J. Hotovec, G. Miroquesada, K. J. Shields, D. Chen

**2:10 —57.** Optimization of viral clearance by anion exchange chromatography in a monoclonal antibody purification: Application of a design of experiments (DOE) approach. **M. E. Dahlgren**, N. Tugcu, E. T. Senderak, D. J. Roush

**2:30 —58.** Developing a design space for the removal of endogenous retrovirus-like particles from mAb feedstocks by an anion exchange chromatography process. **D. M. Strauss**, T. Cano, N. Cai, G. Blank, P. Lester, Q. Chen, B. Yang

**2:50** — Intermission.

**3:05 —59.** Application of design space methodology to a multiscale centrifugation harvest operation with pH induced impurity precipitation and flocculation. **M. Westoby**, R. Haverstock, A. Koswara, Y. Lam, L. Conley

**3:25 —60.** Approaches to defining the design space for a monoclonal antibody platform purification process. **R. Godavarti**

**3:45 —61.** Design space: Use of risk assessments in biologic process development. **E. DiBella**, P. Alred

**4:05 —62.** A tiered approach for process characterization of biopharmaceutical downstream processes. **C. Jiang**, S. Kandula, S. Harou-Kouka, M. Rubacha, D. Dempsey, S. S. Lee, A. A. Shukla

### **Astellas Foundation Award Lectures in Translational Chemistry: Connecting Basic Research to Improve Human Health**

*Sponsored by PRES, Cosponsored by BIOT, MEDI, ENVR, BIOL, IEC, and HEALTH*

### **Systems Chemical Biology: Integrating Chemistry and Biology for Network Models**

*Sponsored by CINF, Cosponsored by COMP, MEDI, HEALTH, and BIOT*

## **MONDAY MORNING**

Section A

Philadelphia Marriott -- Grand Ballroom Salon K

### **Upstream Processing: Molecular and Cellular Approaches in Cell Culture Systems**

*Cosponsored by HEALTH*

E. V. Shusta and R. Venkat, *Organizers*

**8:30 —63.** Manipulating cell signaling for novel antivirulence techniques and metabolic engineering for hydrogen production. **T. K. Wood**

**9:10 —64.** Cell physiology changes during CHO fed-batch cultures. **M. A. Jardon**, D. Y. Kim, M. A. Chaudhry, J. M. Piret

**9:30 —65.** Engineering *Saccharomyces cerevisiae* for the heterologous expression of mammalian G-protein

coupled receptors. **M. A. O'Malley**, J. D. Mancini, C. L. Young, D. Raden, A. S. Robinson

**9:50** — Intermission.

**10:05 —66.** Identification and optimization of peptone-regulated metabolic pathways to develop high-performance chemically-defined processes. **R. E. McCoy**, A. Morris

**10:25 —67.** Probing the dynamics of antibody secretion with SILAC. **N. M. Jacob**, J. C. Yee, K. P. Jayapal, Y -J. Kok, R. J. Philp, T. J. Griffin, W -S. Hu

**10:45 —68.** Improving recombinant protein production in the Baculovirus Expression Vector System via RNA interference mediated silencing of Tn-caspase. **C. G. Hébert**, J. J. Valdes, W. E. Bentley

**11:05 —69.** Promotion effect of 30K proteins on glycosylation in a Chinese hamster ovary cell system. **J. H. Park**, S. S. Choi, T. H. Park

Section B

Philadelphia Marriott -- Grand Blrm Salon I/J

### **Biophysical & Biomolecular Symposium: Protein Engineering**

*Cosponsored by HEALTH*

A. Lugovskoy and D. W. Wood, *Organizers*

**8:30 —70.** Molecular and network modeling in synthetic and systems biology. **B. Tidor**

**9:10 —71.** Computational design of protein-protein interactions. **N. V. Dokholyan**

**9:30 —72.** Protein design from sequence statistics: Protein properties from consensus and correlation. B. J. Sullivan, V. Durani, **T. J. Magliery**

**9:50 —73.** Experimental characterization of a de novo designed calcium binding site. **H. Fazelinia**, P. C. Cirino, C. D. Maranas

**10:10** — Intermission.

**10:25 —74.** Structural understanding of stabilization patterns in engineered bispecific Ig-like antibody molecules facilitates their further optimization. **J. L. Jordan**, J. Arndt, K. Hanf, G. Li, D. Wang, B. Miller, S. Glaser, E. J. Fernandez, A. Lugovskoy

**10:45 —75.** High-resolution homology modeling of antibody Fv regions and application to antibody-antigen docking. A. Sivasubramanian, **A. Sircar**, S. Chaudhury, J. J. Gray

**11:05 —76.** Computer guided protein engineering: Free energy simulation approach. **W. Yang**

Section C

Philadelphia Marriott -- Grand Blrm Salon H



## **Downstream Processing: Scale-Up/Scale-Down (Including HTS)**

D. Frey and S. A. Tobler, *Organizers*

**8:30 —77.** Using robotic high throughput screening to identify extraction conditions from E. coli feedstock. **P. McDonald**, V. N. Sisodiya, T. Peram, J. N. Franklin, P. Lester

**8:50 —78.** High throughput screening of affinity resins and dynamic binding capacity prediction. **L. Dietrich**, N. Tugcu

**9:10 —79.** Microplate based ion-exchange chromatography for high throughput protein purification process design. **S. Yamamoto**, N. Yoshimoto, Y. Nishijima, R. Ozawa

**9:30 —80.** Effect of resin ligand density and column packing quality changes on the separation performance of HIC during column scale up. **J. T. McCue**, P. Engel, J. P. Thommes

**9:50 —** Intermission.

**10:05 —81.** Technology transfer studies performed to improve tangential flow microfiltration clarification of 5,000L Chinese hamster ovary cultures. **T. B. Vickroy**, E. Coates, S. Severino, A. R. Gardner, D. Baker

**10:25 —82.** Large scale DNA precipitation and clarification of adenovirus-containing cell lysate. **A. R. Goerke**, M. E. Laska, S. L. Sagar, J. O. Konz Jr.

**10:45 —83.** Effect of column packing parameters on packed bed stability and chromatography process performance. **J. Higgins**, W. Schwartz, J. Griffin, B. Christensen, P. O'Neil

**11:05 —84.** Scaling up of gradient elution chromatography. **C. R. Narahari**, C. A. Griffin, G. D. Diehl

Section D

Philadelphia Marriott -- Grand Blrm Salon L

## **Quality By Design: Design Space - Upstream**

*Cosponsored by HEALTH*

K. Ram and T. Ryll, *Organizers*

**8:30 —85.** Quality by Design in biotechnology product development and manufacturing. **P. G. Swann**

**9:10 —86.** Use of cell cycle, apoptosis and LDH analysis to characterize a mammalian cell culture scale-down model. **E. Kraus**, J. Pedroso, G. Boros, H. Tift, S. Rianna, C. Woodard

**9:30 —87.** Application of a scale-down cell culture model for design space development. **V. L. Tsang**, A. X. Wang, H. Yusuf-Makagiansar, T. Ryll

**9:50 —** Intermission.

**10:05 —88.** Product quality assessment during cell line selection and process development. **F. Li**, D. Brown, C. Opel, E. Pacis, R. Bayer

**10:25 —89.** Quality by Design characterization of a fed-batch cell culture process from vial thaw to harvest. **S. Abu-Absi**, P. Thompson, L. Yang, M. Newhouse, M. Andrabi, B. Schilling, A. A. Shukla, S. S. Lee

**10:45 —90.** Experimental design strategies for defining the design space of a cell culture process. **N. McKnight**, D. Coleman, S. R. Chary, R. Kiss, B. Kelley

Section E

Philadelphia Marriott -- Franklin 8

### **Biophysical & Biomolecular Symposium: Current Challenges In Protein Formulations**

*Cosponsored by HEALTH*

T. W. Randolph and S. Hershenson, *Organizers*

**8:30 —91.** Hydrogen bond network lifetime as an indicator of protein stability in pharmaceutical preparations. **M. T. Cicerone**, J. M. Johnson

**8:50 —92.** Analysis of protein-excipient interactions in amorphous solids by hydrogen/deuterium exchange with mass spectrometry. S. Sinha, Y. Li, T. D. Williams, **E. M. Topp**

**9:10 —93.** Mediating sorbitol crystallization-induced aggregation in frozen monoclonal antibody formulations. **G. Ratnaswamy**, D. M. Piedmonte, A. Butler, L. Karamujic, P. R. Parmar, H. Lin, W. Cao, K. Nagapudi, S. Hershenson

**9:30 —94.** Interactions of an IgG1 with siliconized glass beads. **P. Basu**, J. Carpenter, T. W. Randolph, S. Krishnan

**9:50 —** Intermission.

**10:05 —95.** The interaction of a monoclonal antibody with stainless steel, cellulose, glass, and tungsten. **J. Bee**, S. Sawicki, D. Chiu, S. A. Nelson, J. Stevenson, K. Chatterjee, R. Platz, E. Freund, J. F. Carpenter, T. W. Randolph

**10:25 —96.** Mechanical stress testing of therapeutic antibodies. **A. Pappenberger**

**10:45 —97.** Impact of high concentration formulations on drug product processing. **N. Rathore**, C. Chen, O. Gonzalez, W. Ji

**11:05 —98.** Strategies for achieving buffer concentration, protein concentration and pH targets during the ultrafiltration of concentrated therapeutic proteins. **G. Bolton**, D. LaCasse, H. Acharya, J. Basha, A. Boesch

## Probe Development in Molecular Imaging and Therapy

### PET/SPECT/Therapy

*Sponsored by INOR, Cosponsored by BIOT, NUCL, and HEALTH*

### MONDAY AFTERNOON

Section A

Philadelphia Marriott -- Grand Blrm Salon K

### Upstream Processing: Advances in Cell Culture Process Development

*Cosponsored by HEALTH*

S. W. Harcum and J. Sridhar, *Organizers*

**1:30 —99.** Agitation and aeration of GS-NS0 cell culture for large-scale monoclonal antibody production. **D. Adams**, R. Heckathorn, E. Frieden

**1:55 —100.** Assessment of platform vaccine process development and improvement of vaccine productivity through bioprocess optimization. **K. Aggarwal**, F. Jing, D. Pancholi, R. Schwartz, J. Liu, L. Maranga

**2:20 —101.** Design, characterization and scale up of microsparged 200L perfusion reactor. **A. Subramanian**, M. Jenne, D. Havekost, H. Brod, G. Dudziak

**2:45 —** Intermission.

**3:05 —102.** Effect of the interaction between feed storage and cell age on mAB titers in cell culture fed-batch process. **R. Vadali**, W. J. Meyer

**3:30 —103.** On-line process monitoring and feedback control for rapid development of better optimized cell culture processes. **V. L. Tsang**, A. X. Wang

**3:55 —104.** Using fibrous microcarriers in quantitative 3-D cell culture for antibody production. **Y. Wen**, X. Zhang, S -T. Yang

Section B

Philadelphia Marriott -- Grand Blrm Salon I/J

### Biophysical & Biomolecular Symposium: Protein Stability During Bioprocessing

*Cosponsored by HEALTH*

N. Rathore and E. J. Fernandez, *Organizers*

**1:30 —105.** Controlling rate of oxidation and color formation for a human monoclonal antibody in cell culture harvest. **A. B. Magill II**

**1:55 –106.** Effects of urea induced protein conformational changes on ion exchange chromatographic behavior. **Y. Hou**, W. K. Chung, A. S. Freed, T. B. Hansen, S. M. Cramer

**2:20 –107.** Not all aggregates are the same: So, should they all be removed? **J. E. Shultz**

**2:45 –** Intermission.

**3:05 –108.** Development of an affinity chromatography elution step to enhance stability of a therapeutic monoclonal antibody: An aggregation case study. **R. Chmielowski**, D. J. Roush

**3:30 –109.** Universal secondary structure perturbation mode for proteins in reversed-phase chromatography. **A. Laurent**, T. Przybycien

**3:55 –110.** Manufacturability assessment for a successful therapeutic product. **Y. Jiang**

Section C

Philadelphia Marriott -- Franklin 8

## **Downstream Processing: Non-Chromatographic Separations**

C. J. Roberts and T. Cano, *Organizers*

**1:30 –111.** Application of the ELP-intein-based nonchromatographic protein purification technique to the CHO expression system. **W -Y. Wu**, D. W. Wood

**1:55 –112.** Can downstream handle 10 G/L? Selective precipitation of monoclonal antibodies vs. traditional Protein A capture. **O. A. Jaquez**, R. S. Gronke, P. de Vilmorin

**2:20 –113.** Selective precipitation using polyelectrolytes: Capture and recovery of precipitated antibody using depth filtration. **V. N. Sisodiya**, P. McDonald, R. Fahrner, J. N. Franklin, K. P. Lazzareschi

**2:45 –** Intermission.

**3:05 –114.** Development of a high throughput virus filtration step. **H. F. Liu**, S. Hove

**3:30 –115.** Virus retention validation of parvovirus filters: Challenges and solutions. **E. Gefroh**, L. Madrid, J. Fisher, J. Parrella, H. Dehghani, S. Vunnum, G. Vedantham

**3:55 –116.** Clearance of biological impurities using improved membrane adsorbers. **M. R. Etzel**, W. T. Riordan

Section C

Philadelphia Marriott -- Grand Blrm Salon H

**Elmer Gaden Award Lecture**

W. Zhou, *Organizer*

**5:00 – 117.** Reengineering biopharmaceuticals for delivery to the brain with molecular Trojan horses. **W. Pardridge**

Section D

Philadelphia Marriott -- Grand Blrm Salon L

### **Quality By Design: Defining Critical Quality Attributes**

*Cosponsored by HEALTH*

I. Apostol and Y. Lyubarskaya, *Organizers*

**1:30 – 118.** Integrated scientific knowledge and risk analysis approach for the determination of monoclonal antibody critical quality attributes. **D. Jen**, M. Cunningham, Y. Feng, G. Powers, S. Taudte, J. Horwitz, D. Jan, M. Tang, A. Dinerman, P. Alred, P. Alfonso

**1:50 – 119.** Identification of critical quality attributes of monoclonal antibodies. **P. Motchnik**

**2:10 – 120.** Assessment of manufacturability of protein drug candidates by ranking of antibody candidates based on accelerated stability studies. K. Hathaway, **S. Gao**, S. Laura, J. Chang, A. Buko

**2:30 – 121.** Use of biophysical techniques to determine quality attributes of protein therapeutics. **Y. Jiang**, R. Ramachander, J. Wen, C. Li, J. Li, L. Narhi

**2:50 –** Intermission.

**3:05 – 122.** Biological significance of protein microheterogeneity. **G. C. Flynn**, D. Y. Liu, X. Chen

**3:25 – 123.** Unconjugated antibody levels in immunoconjugates: A critical quality attribute? **C -T. Huang**

**3:45 – 124.** Regulatory aspects of antibody-based immunoconjugates. **J. T. Park**, C. Fuchs, P. Swann

**4:05 – 125.** Multivariate analysis: How to find a needle in a datastack. **H. Kornmann**, D. Voisard, G. Baer

Section E

Philadelphia Marriott -- Grand Blrm Salon H

### **E. V. Murphree Award in Industrial & Engineering Chemistry: Symposium in Honor of Georges Belfort**

M. Belfort, *Organizer*

**12:30 – 126. Award Address** (E.V. Murphree Award in Industrial & Engineering Chemistry, sponsored by

ExxonMobil Research & Engineering Company). A molecular and classical approach to engineering: From fundamentals to applications. **G. Belfort**

## **Probe Development in Molecular Imaging and Therapy**

### **MRI/Ultrasound**

*Sponsored by INOR, Cosponsored by BIOT, NUCL, and HEALTH*

## **Undergraduate Research Poster Session: Biochemistry**

*Sponsored by CHED, Cosponsored by BIOT, BIOL, and SOCED*

## **MONDAY EVENING**

Section A

Pennsylvania Convention Center -- Hall C

### **Poster Session**

#### **Biophysical & Biomolecular Engineering**

H. Shen, Y. Lei, and H. Yi, *Organizers*

**6:00 - 8:00**

**127.** Electron transfer experiments: An insight into the alkaline conformational transition of cytochrome c. **S. Bandi**, B. E. Bowler

**128.** A highly efficient selection method for de novo protein engineering. **M. Pawlowski**, K. D. Wittrup

**129.** A novel cellulase assay with AFM microcantilevers. **L. Zhao**, J. Xi, G. Yang

**130.** Activation of bone marrow-derived mast cells as investigated by a combined atomic force and laser scanning confocal microscopy. **Z. Deng**, T. Zink, H -Y. Chen, D. Walters, F -T. Liu, G -Y. Liu

**131.** AFM measurement of interactions among split inteins. **M. Sorci**, B. Dassa, S. Pietrokovski, G. Belfort

**132.** Aggregation and oxidation in PEG-GCSF and GCSF by different peroxides and degraded polysorbate. **G. C. Chu**, Y. Zhang, P. R. Parmar, D. Chelius, T. Osslund, D. M. Piedmonte, M. J. Treuheit

**133.** Antibody fragment engineering. J. Xiao, A. M. Kukuch, R. Chen, M. Pawlicki, B. S. Hamilton, **T. J.**

## Tolbert

134. Biotechnical applications of a protein refolding enzyme. **M. Fernandes**, A. Cavaco-Paulo
135. Cell-free protein biosynthesis utilizing maltodextrin as an energy source. **Y. Wang**, Y -H. P. Zhang
136. Characterizing the viscoelastic properties of high concentration antibody solutions using quartz crystal microbalance with dissipation technology. **S. Kanapuram**, A. Patel, B. A. Kerwin
137. Combinatorial biophysics: Library approaches to hydrophobic core repacking of the four-helix bundle protein Rop. **J. J. Lavinder**, S. B. Hari, T. J. Magliery
138. Conformation of peptide neck domains for cosmetic applications. **A. Cavaco-Paulo**
139. Construction of an array of glucose indicator proteins for continuous glucose monitoring. **S. Jin**, G. Jared, J. Veetil, T. Thote, **K. Ye**
140. Covalent and noncovalent cross-linking of polypeptides at solid-liquid interface. **A. K. Dutta**, A. Nayak, G. Belfort
141. Design and characterization of a pH triggered homo-dimeric antiparallel coiled coil. **R. P. Nagarkar**, J. P. Schneider
142. Determination of the mass transfer coefficient of PAMAM dendrimers into pancreatic cancer cells. **A. W. Opitz**, K. J. Czymmek, E. Wickstrom, N. J. Wagner
143. Development of in vivo and in vitro systems for studying the expression and activation of [FeFe] hydrogenases and their required maturases. **J. M. Kuchenreuther**, M. E. Boyer, J. A. Stapleton, J. R. Swartz
144. Direct identification and quantification of aspartyl succinimide in an IgG2 mAb by RapiGest assisted digestion. **H. Z. Huang**, A. Nichols, D. Liu
145. Efficient delivery of superoxide dismutase using polyketal microparticles. **G. S. Iyer**, D. S. Wilson, S. Dikalov, N. Murthy, M. E. Davis
146. Engineering a plasmid display system for the directed evolution of targeted cell penetrating peptides. **S. Gao**, M. J. Simon, B. Morrison III, S. Banta
147. Evaluation and modeling of nonspecific binding of polysorbate-20 with filter membranes during drug product production. **G. Jiang**, J. Zhou, J. Qiu, S. Gunasekera, M -V. Wadhwa
148. Global and residue-specific aspects of denaturant-induced conformational changes in a beta-trefoil protein. **R. F. Latypov**, D. Liu, J. Jacob, T. S. Harvey, D. N. Brems, A. A. Raibekas
149. Heterodimeric DNA methyltransferases. **G. E. Meister**, S. Chandrasegaran, M. Ostermeier
150. Identification of interfacial regions that are involved in aggregate formation. **J. Primack**, D. Chelius, H. Gadgil, C. Kolvenbach, R. S. Rajan

- 151.** Immobilized metal-affinity protein delivery via polyketal microparticles. **J. C. Sy**, N. Murthy, M. E. Davis
- 152.** Introducing a novel activity into the RhlI enzyme by directed evolution. **L. Sun**, P. K. R. Kambam
- 153.** Modulating inhibition of bacterial toxins by multivalent glycopolypeptides via appropriate engineering of the glycopolypeptide chain. **R. Maheshwari**, B. D. Polizzotti, E. Levenson, K. L. Kiick
- 154.** Monitoring covalent modifications in protein therapeutics and evaluation of shelf life stability. **B. Yu**
- 155.** Nicotinamide increases the megakaryocytic maturation of human hematopoietic stem cells primarily due to sirtuin inhibition. **S. Panuganti**, E. T. Papoutsakis, W. M. Miller
- 156.** Novel biosensor for thyroid hormone endocrine disruptors. I. Hartman, D. W. Wood, **T. W. Eyster**
- 157.** Peptide-nucleic acid conjugates in the design of macromolecular assemblies. **E. Sahin**, K. L. Kiick, T. Hanson
- 158.** Reducing polypeptide aggregation by site-specific modification with betaine. **J. Xiao**, T. J. Tolbert
- 159.** Separation of charge variants of a humanized IgG1 monoclonal antibody. **J. Vlasak**, E. Green-Trexler, M. Kirchmeier, R. M. Ionescu
- 160.** Silicone oil induced particle formation in prefilled syringes. **M. Ricci**, L. Donahue, N. Ball, N. Stackhouse, J. Lee, S. Krishnan, M. M. Pallitto
- 161.** Simulation of amyloid beta in a lipid bilayer. **A. J. Sodt**, T. Head-Gordon
- 162.** Stability of surface-tethered proteins. **G. Anand**, G. Belfort
- 163.** Strategies to improve recombinant proteins solubility and purification by fusion with thermally-responsive polypeptides. **R. Araujo**, M. Casal, A. Cavaco-Paulo
- 164.** Structural and functional analysis of *Alternaria brassicicola* cutinase. **J. K. Montclare**
- 165.** Sustained and localized gene silencing in vitro and in vivo using PLGA nanoparticles densely loaded with small-interfering RNA. **K. A. Woodrow**, J. K. Saucier-Sawyer, J. S. Blum, M. J. Wood, W. M. Saltzman
- 166.** Targeted membrane recognition by designed hydrogen bonding between synthetic phospholipids. **M. Ma**, D. Bong
- 167.** Useful applications of synthetic modified-sugar nucleotide donor substrates. **M. R. Manzoni**, E. Boeggeman, B. Ramakrishnan, P. K. Qasba
- 168.** Cationic nanogel formulations of nucleoside analogs for the treatment of drug-resistant tumors. **S. V. Vinogradov**, C. M. Galmarini, A. Mitin, A. Zeman
- 169.** Characterization of AI-2 uptake mechanism in *E. coli* quorum sensing circuitry. **S. Hooshangi**, C -Y. Tsao, W. E. Bentley



- 170.** Characterization of stability and activity of fluorinated histone acetyl transferase, tGcn5. **N. Voloshchuk**, A. Y. Zhu, J. K. Montclare
- 171.** Complexes of  $\alpha$ -gliadin and polymers with different composition. **L. Liang**, M. Pinier, J -C. Leroux, M. Subirade
- 172.** Design and installation of a pilot scale biodisposable DeltaV based bioreactor network for cell culture process monitoring, control and data management. **T. A. Allotta**, C. Opel, T. Hudson, T. Myint
- 173.** Effects of Impeller-Sparger configurations on mass transfer capabilities and cell culture performance. **C. Berdugo**, J. J. Chalmers, I. Blumentals, O. Lara-Velasco
- 174.** Genes associated with hydroxysafflor yellow A revealed by cDNA-AFLP in *Carthamus tinctorius*. **M. Guo**
- 175.** Identification of *Bifidobacterium animalis* subsp. *lactis* strains using PCR primers design from *dnaK* gene. **Y -C. Yang**, Y -C. Chiang, H -Y. Tsen
- 176.** In vitro LsrK: Toward an AI-2 phosphorylation nanofactory that modulates bacterial talk. **V. Roy**, R. Fernandes, C -Y. Tsao, W. E. Bentley
- 177.** Investigation into concentration gradient formation in high concentration antibody formulations. **S. Gunasekera**, G. Jiang, A. Thummala, M -V. Wadhwa
- 178.** LsrR-mediated switching of gene expression in *E. coli* based upon phosphorylation of the quorum-sensing signal molecule AI-2. **C. M. Byrd**, C -Y. Tsao, J. J. Sumner, W. E. Bentley
- 179.** Production of recombinant human macrophage colony stimulating factor with lightweight polymeric microsphere culture system. **C -Y. Wang**, H -F. Liao, C. W. Chen
- 180.** Proteome analysis for soluble BDNF production in *E. coli* periplasm. **N. Shimizu**, S. Tago, M. Nakagawa, N. Atoh, Y. Kurokawa
- 181.** Rapid flow modeling for mammalian cell bioreactor scale-up studies. **M. Horner**, S. Gohel, S. Joshi, B. Bell
- 182.** Robust modeling of qRT-PCR data using logistic equations. **M. Liu**, C. Zhang, C. Uhde-stone, C. Goudar
- 183.** RTD study of RFBB in viscous biopolymer fermentation. **C -S. Hsu**, S -T. Yang
- 184.** Structure and macromolecular organization of cartilage proteoglycans. **F. Horkay**, D. C. Lin, I. Horkayne-Szakaly, C. Silva, E. K. Dimitriadis, P. J. Basser
- 185.** System development for expression of G-protein coupled receptor (GPCR) fragments. **Z. T. Britton**, T. Polenova, A. S. Robinson
- 186.** Transcriptional orchestration and control of clostridial sporulation. **S. W. Jones**, C. Paredes, B. Tracy, N. Cheng, R. Sillers, R. S. Senger, E. T. Papoutsakis

- 187.** Tuning rheological properties of cell receptor responsive heparinized hydrogels. **A. D. Baldwin**, T. Nie, K. L. Kiick
- 188.** Biofunctionalization methods of silicon surfaces. **A. Kim**, C. S. Ah, C. W. Park, J -H. Yang, I -B. Baek, C -G. Ahn, G. Y. Sung
- 189.** Conversion of a human IgG2 structural isoform in vivo. **Y. D. Liu**, X. Chen, M. Plant, G. C. Flynn
- 190.** Dynamic kinetic resolution of amino acid compounds in organic media. **T. Kijima**, R. Kasahara, R. Oenoki, T. Nara, T. Izumi, N. Ohya
- 191.** Engineering green fluorescent protein for improved reassembly to study protein-protein interactions in vivo. **M. Sarkar**, T. J. Magliery
- 192.** Engineering transcription factors with novel DNA-bind specificity. **C. Rao**, T. A. Desai
- 193.** Investigation of interaction between A $\beta$ (1-40) aggregates and model lipids with hydrogen exchange. **W. Qi**, T. A. Good, E. J. Fernandez
- 194.** Optimization of a dual-enzyme peptide mapping method. **J. Wang**, O. Borisov, B -J. Shyong, M. Eng, V. Ling
- 195.** Particle characterization in protein solutions using Micro-Flow Imaging<sup>TM</sup>. **N. Jiao**, S. Cao, J. Pollastrini, L. Donahue, Y. Jiang, L. Narhi
- 196.** Reassessing methods for quantifying retrovirus-like particles from cultures of rodent cell lines. **P. A. Duncan**, S. Downing
- 197.** Revealing protein switch design principles through directed evolution. **J. A. Tullman**, M. Ostermeier
- 198.** Submicron protein aggregation monitoring by field flow fractionation. **J. Pollastrini**, S. Cao
- 199.** Synthesis of near-infrared heptamethine cyanine fluorescence dye for biomolecular detection. X. Qiang, J. Jiang, **X. Peng**
- 200.** Systems analysis of pentose transport regulation. **T. A. Desai**, C. Rao

Section B

Pennsylvania Convention Center -- Hall C

**Poster Session**

**Downstream Processing**

H. Shen, Y. Lei, and H. Yi, *Organizers*

**6:00 - 8:00**

- 201.** Isolation and characterization of host cell protein from cell culture process unit operations for directed clearance studies. **J. Adams**, A. Lewis, R. Hart
- 202.** Diafiltration and recovery of a pegylated peptide by tangential flow filtration. **A. A. Wieczorek**
- 203.** A quality by design approach toward modular clearance for low-pH retrovirus inactivation. **J. Nolting**, M. Quertinmont, K. Shields, G. Miroquesada, D. Chen
- 204.** An affinity-based strategy for the design of selective displacers for the chromatographic separation of proteins. **S. Vutukuru**, S. D. Kate, S. A. McCallum, C. J. Morrison, S. M. Cramer, R. S. Kane
- 205.** Approaches to comparability issues of a recombinant human IgG4 caused by process changes. **X. C. Lu**
- 206.** Automated microscale screening of operating conditions for mixed-mode chromatography. **C. L. Daniels**, M. D. Wenger, P. DePhillips, M. E. Laska
- 207.** Crossflow microfiltration of E.coli cell lysate containing inclusion bodies of a recombinant protein biopharmaceutical. **A. Venkiteshwaran**, A. Bogsnes, A. Staby, G. Belfort
- 208.** Determining the feasibility of using MabSelect SuRe resin on multiple products. **J. A. Lepore**, J. M. Wesner, D. L. Gill, L. R. Bink, C. Liu, M. I. Richards
- 209.** Development and optimization of a parvovirus-retentive viral filter for a biological process. **C. A. Bogaerts**, R. M. Boychyn, D. Maheu, S. Rosenthal, S. J. Abraham
- 210.** Development of a monoclonal antibody purification process to remove aggregate. **J. Richter**, A. Arbutina, F. Meacle, E. DiBella, P. Alred
- 211.** Evaluation and removal of key plant-derived impurities during downstream process development. **L. R. Wilken**, **G. Barros**, S. L. Woodard, Z. L. Nikolov
- 212.** Impact of the harvest clarification on downstream performance: A mAb product case study. **T. McNerney**, S. Trimble
- 213.** Maximizing productivity of protein-A chromatography operation. **T. Hong**, J. Zhou
- 214.** Quality aspects of microtiter plate workflow in the screening of chromatographic conditions. **T. J. E. Bergander**, L. Kärf, K. Brännström-Carlsson
- 215.** Analysis of fouling within microporous membranes in biopharmaceutical applications. **C. Bondy**, C. Santeufemio
- 216.** Benefits of an anaerobic, chemically-controlled process when scaling a peptibody refold. **A. Ebner**, R. N. Keener III, J. E. Shultz
- 217.** Challenges of ultrafiltration processing with high concentration IgG solutions. **J. T. Petrone**
- 218.** Cleaning cycling study of a new Protein A affinity resin for the purification of a monoclonal antibody.

**S. M. Liu**, F. Meacle, E. DiBella, P. Alred

- 219.** Design and optimization of a filter train for precipitate removal. **S. Kandula**, S. Babu, S. S. Lee, A. A. Shukla
- 220.** Development of effective anion-exchange chromatographic steps for a challenging monoclonal antibody using a novel resin screening method and optimization tools. **H. Shen**, M. Goldfarb, K. Fixler, J. Shervin, S. Solivan, J. Bodek, S. Savino, A. Velayudhan, E. Dibella, P. Alred
- 221.** Early and late phase monoclonal antibody purification process improvement using Capto™ MMC mixed-mode resin. **K. Fixler**, S. Sharlene, S. Solivan, M. Goldfarb, H. Shen, E. Dibella, P. Alred
- 222.** Implementation of a pilot scale disc stack centrifuge in a multiproduct GMP facility. **E. Jeppe**, M. Kessler, J. Sridhar
- 223.** Impurity removal during clarification of cell culture harvest with continuous flow centrifugation and depth filtration. **J. A. Lepore**, J. M. Wesner, D. L. Gill, L. R. Bink, C. Liu, D. Dong, T. Gervais, S. Savino, M. Teeters
- 224.** Model development of a Protein A chromatographic elution step for addressing viscosity issues at high elution concentrations. **J. Bodek**, J. Ferraro, A. Arbutina, P. Gahr, C. Alderfer, S. Green, F. Meacle, A. Velayudhan, E. DiBella, P. Alred
- 225.** Planova 15N filter performance and small virus clearance in the mAb1 purification process: A feasibility study. **M. Bailey**, M. Felo, B. Lin, E. DiBella, P. Alred
- 226.** Process optimization for recovery of a recombinant protein by osmotic shock. A. Englehart, D. Roth, T. Svab, **P. M. McHugh**
- 227.** Process step capabilities for clearing process and product-related impurities when challenged with a worst case feed. **K. M. Schmidt**, V. Reynolds
- 228.** Rapid protein purification to support biologics discovery. **J -H. Hsieh**, T. St. Clair, D. Lee, A. Sun, D. Vesey, T. Abassi, N. Connors, B. Junker
- 229.** Removal of hydrophobic impurities using a multimodal resin. **T. Gervais**, D. Dong, A. Walsh, M. Stella, N. Quinlan, P. Alred, P. Alfonso
- 230.** Screening cation exchange resins for dynamic binding capacity and selectivity. **C. C. Lee**, M. Chandler, N. Tugcu, D. J. Roush
- 231.** Subvisible particle investigation for an antibody solution in prefilled syringes. **G. Jiang**, N. Thyagarajapuram, M. Verardo, G. Juan, M -V. Wadhwa
- 232.** The systematic evaluation of Protein A chromatography for virus clearance using designed experiments. **Q. Zhang**, B. Pies, L. Metzka, G. Miroquesada, D. Chen
- 233.** Theoretical analysis and experimental data of excipient concentrations in final ultrafiltration and diafiltration process using Poisson-Boltzmann equation. **T. Tran**, M. Teeters, E. DiBella, P. Alred

**234.** Use of a chaotrope for aggregate reduction in monoclonal antibody purification process. **M. Goldfarb**, H. Shen, K. Fixler, S. Suzanne, S. Sharlene, J. Bodek, E. Dibella, P. Alred

**235.** Viral clearance evaluation for monoclonal antibody purification processes using Capto™ MMC and Capto™ adhere resins . **K. Fixler**

## TUESDAY MORNING

Section A

Philadelphia Marriott -- Grand Blrm Salon I/J

### Upstream Processing: Advances in Metabolic Engineering

*Cosponsored by HEALTH*

K. J. Prather and N. G. Dalal, *Organizers*

**8:30 — 236.** Metabolic engineering of *Escherichia coli* for cadmium accumulation and CdS nanocrystals synthesis. **W. Chen**

**9:10 — 237.** Developing a true autoinducible recombinant protein expression platform by harnessing native quorum signaling circuitry in *Escherichia coli*. **C -Y. Tsao**, S. Hooshangi, L. Wang, J. J. Valdes, W. E. Bentley

**9:30 — 238.** DNA assembler, a highly efficient approach for rapid construction of large recombinant DNA for metabolic pathway engineering and synthetic biology. **Z. Shao**, H. Zhao

**9:50 —** Intermission.

**10:05 — 239.** Heterologous expression of D-xylulokinase from *Pichia stipitis* enables high levels of xylitol production during growth on xylose in engineered *Escherichia coli*. P. C. Cirino, **O. Akinterinwa**

**10:25 — 240.** Improving cofactor availability for recombinant phytochemical production. **J. A. Chemler**, Z. Fowler, A. Chitalia, M. Koffas

**10:45 — 241.** Engineering synthetic pathways for production of higher alcohols as biofuels. **S. Atsumi**, J. C. Liao

**11:05 — 242.** High-titer production of hydroxyvalerates from levulinate. **C. H. Martin**, K. J. Prather

Section B

Philadelphia Marriott -- Grand Blrm Salon K

### Biophysical & Biomolecular Symposium: Protein Aggregation

*Cosponsored by HEALTH*

A. Shah and P. M. Tessier, *Organizers*

**8:30 —243.** Biophysical study of the aggregation of human lysozyme into amyloid fibrils. **A. Dhulesia**, A. J. Baldwin, M. F. Mossuto, X. Salvatella, C. M. Dobson

**8:55 —244.** Structural changes during early oligomerization of A $\beta$ (1-40) revealed by peptide-level solvent accessibility analysis. **A. Zhang**, E. J. Fernandez

**9:20 —245.** A $\beta$  neurotoxicity: Role of aggregate size and elucidation of key amino acids. **B. Keshet**, T. A. Good

**9:45 —** Intermission.

**10:05 —246.** Membrane interactions of protein fibrils and amyloids – a good thing? **R. Jelinek**

**10:30 —247.** Salt dependence of aggregation kinetics of Sup35NM. **A. S. Bommarius**, V. Yeh, B. Chen, A. Romaniuk, Y. O. Chernoff

**10:55 —248.** Analysis of protein misfolding and aggregation using peptide microarrays. M. Bhattacharya, J. Lin, S. M. Sukumaran, J. S. Dordick, **P. M. Tessier**

Section C

Philadelphia Marriott -- Grand Blrm Salon L

### **Downstream Processing: Emerging Technologies for Downstream Processing**

D. W. Wood and S. Ghose, *Organizers*

**8:30 —249.** Lyophilized, adjuvanted vaccines: Processing effects on particle size, protein stability, protein adsorption and efficacy. **T. W. Randolph**, A. Clausi, S. Bai, J. F. Carpenter

**9:10 —250.** Multicolumn countercurrent solvent gradient purification of proteins (MCSGP-Process). **L. Aumann**, T. Mueller-Spaeth, G. Stroehlein, M. Morbidelli

**9:30 —251.** BioSMB: A new continuous disposable chromatography process. **M. A. Bisschops**, T. Ransohoff

**9:50 —** Intermission.

**10:05 —252.** Cell immobilization and biosurfactant-induced pellet formation as potential means to retain *Trichoderma reesei* cells during in situ affinity foam fractionation for cellulase collection. Q. Zhang, C -M. Lo, N. Srinivasan, **L -K. Ju**

**10:25 —253.** Development of chemically selective displacement processes for industrial applications. **C. J. Morrison**, S. Park, S. A. McCallum, J. A. Moore, S. M. Cramer

**10:45 —254.** Self-cleaving intein-mediated protein purification in *Pichia pastoris*. **B. A. Fong**, D. W. Wood

**11:05 —255.** Clearing trace HCP, DNA and viruses in the manufacture of biologics: A novel single use anion exchange membrane adsorber. **A. Becerra-Arteaga**, J. Neville, M. W. Phillips

## Section D

Philadelphia Marriott -- Grand Blrm Salon H

### **Biophysical & Biomolecular Symposium: Targeted Delivery of Proteins and Nucleotides**

#### **Extracellular and Intracellular Delivery**

*Cosponsored by HEALTH*

B. S. Vig and Y. J. Kwon, *Organizers*

**8:30 —256.** Protein engineering in biomedicine. **K. D. Wittrup**

**9:10 —257.** Tailored intracellular fates of ketalized polyethylenimine/nucleic acids polyplexes for controlled therapeutic effects. M. S. Shim, **Y. J. Kwon**

**9:30 —258.** Silent packaging for gene silencing: Tobacco mosaic virus RNAi delivery. **C -W. Hung**, E. R. Howarth, H -C. Wu, A. D. Brown, C -Y. Tsao, P. Kofinas, J. N. Culver, W. E. Bentley

**9:50 —** Intermission.

**10:05 —259.** Quantum dot-based nuclease-resistant molecular beacons for visualizing the Coxsackievirus replication in living cells via TAT peptide delivery. **H -Y. Yeh**, M. V. Yates, A. Mulchandani, W. Chen

**10:25 —260.** Chemically controlled assembly of antibody nanorings. **Q. Li**, D. Hapka, H. Chen, D. A. Vallera, C. R. Wagner

**10:45 —261.** A new reactive oxygen species sensitive drug delivery vehicle for targeting oxidative stress. **D. S. Wilson**, N. Murthy

**11:05 —262.** Development of cell-specific gene delivery methods for vascular applications. K. M. Blocker, P. G. Millili, S. L. Myrick, **M. O. Sullivan**

## Section E

Philadelphia Marriott -- Franklin 8

### **Stem Cells: Stem Cell Based Tissue Engineering**

*Cosponsored by HEALTH*

C. Xu and E. S. Tzanakakis, *Organizers*

**8:30 —263.** Matrix elasticity directs stem cell lineage: From tissue measurements to polymeric mimics. **D. E. Discher**, F. Rehfeldt

**9:10 —264.** Hydrodynamic regulation of embryonic stem cell differentiation. C. Y. Sargent, G. Y. Berguig, L. Hiatt, R. L. Carpenendo, R. E. Berson, **T. C. McDevitt**

**9:30 —265.** Controlled cardiomyocyte differentiation from human embryonic stem cells for cell transplantation therapy. **C. Xu**, S. Police, N. Rao, M. Hassanipour, Y. Li, J. Yang, W. B. Wang, Y. Chen, C. Priest, K. Chen, W -Z. Zhu, M. Laflamme, C. Murry, A. Davies, J. Lebkowski, J. D. Gold

**9:50** — Intermission.

**10:05 —266.** Embryonic stem cell expansion and directed differentiation in bioreactors with continuous agitation. **E. S. Tzanakakis**, D. E. Kehoe, L. T. Lock, A. Parikh

**10:25 —267.** Aryl hydrocarbon receptor is activated during megakaryopoiesis in response to physiologic ligands. **S. Lindsey**, P. Apostolidis, E. T. Papoutsakis

**10:45 —268.** Promoting local stem cell differentiation using engineered, modular growth factors. J -S. Lee, **W. L. Murphy**

**11:05 —269.** Scaffolds based on degradable alginate hydrogels and poly(lactide-co-glycolide) (PLGA) microspheres for stem cell culture. R. S. Ashton, **A. Banerjee**, S. Punyani, D. V. Schaffer, R. S. Kane

## **Probe Development in Molecular Imaging and Therapy**

### **PET/SPECT/Therapy**

*Sponsored by INOR, Cosponsored by BIOT, NUCL, and HEALTH*

## **TUESDAY AFTERNOON**

Section A

Philadelphia Marriott -- Grand Blrm Salon I/J

### **Upstream Processing: Advances in Metabolic Engineering**

*Cosponsored by HEALTH*

K. J. Prather and N. G. Dalal, *Organizers*

**1:30 —270.** Model-driven metabolic engineering of *E. coli* to produce high-value compounds. **A. M. Feist**, B. O. Palsson

**1:55 —271.** Genome-scale model development for *Clostridium acetobutylicum* and the influence of proton flux states. **R. S. Senger**, E. T. Papoutsakis

**2:20 —272.** Development of metabolic kinetic model using MCMC simulation for a large-scale fed-batch CHO cell culture. **Z. Xing**, N. Bishop, Z. J. Li, K. Leister, S. Lee



**2:45** — Intermission.

**3:05 —273.** Genome-scale metabolic network model of Arabidopsis. **C. Dal'Molin**, L -E. Quek, L. K. Nielsen

**3:30 —274.** Multiplex recombineering: Progress toward the multigenic insertion of regulatory elements and potential applications in metabolic engineering. **J. R. Warner**, A. Karimpour-Fard, R. T. Gill

**3:55 —275.** Microfluidic droplets as nanobioreactors for screening libraries of engineered strains. **B. Wang**, H. Zhou, D. A. Weitz, G. N. Stephanopoulos

Section B

Philadelphia Marriott -- Grand Blrm Salon K

### **Biophysical & Biomolecular Symposium: Protein Aggregation**

*Cosponsored by HEALTH*

A. Shah and P. M. Tessier, *Organizers*

**1:30 —276.** Deconvoluting nonnative aggregate nucleation and competing growth mechanisms by combined kinetic, spectroscopic, and light scattering analysis. **Y. Li**, B. A. Ogunnaike, C. J. Roberts

**1:55 —277.** A universal pathway for amyloid nucleus and precursor formation for insulin. **A. Nayak**, M. Sorci, S. Krueger, G. Belfort

**2:20 —278.** Reversibility and regioselectivity in thiol/disulfide interchange of tocinoic acid with glutathione in lyophilized solids. **L. Zhang**, T. D. Williams, E. M. Topp

**2:45** — Intermission.

**3:05 —279.** Monoclonal antibody interactions and phase behavior. **R. A. Lewus**, A. M. Lenhoff, S. I. Sandler

**3:30 —280.** Elucidation of two major aggregation pathways in an IgG2 antibody. **J. Jacob**, N. Van Buren, D. Rehder, H. Gadgil, M. Matsumura

**3:55 —281.** Differences in aggregation propensity between IgG1 and IgG2 isoforms of antistreptavidin: Role of conformational changes and covalent interactions. **S. Brych**, H. Hultgen, C. Kolvenbach, R. Rajan

Section B

Philadelphia Marriott -- Grand Blrm Salon H

### **Marvin J. Johnson Award Lecture**

W. Zhou, *Organizer*

**5:00 —282.** Lowering cholesterol and raising antibodies. **B. Buckland**

Section C

Philadelphia Marriott -- Grand Blrm Salon L

### **Downstream Processing: Emerging Technologies for Downstream Processing**

D. W. Wood and S. Ghose, *Organizers*

**1:30 —283.** Monoclonal antibody purification using continuous countercurrent ion-exchange chromatography. **T. Mueller-Spaeth**, L. Aumann, G. Stroehlein, H. Kornmann, M. Morbidelli

**1:55 —284.** Capacity, productivity and cost of operation characterization of a novel high performance protein A chromatography media. **J. Neville**, C. Wang, B. Raghunath, C. Duclos-Orsello, A. Becerra-Arteaga, F. Mann

**2:20 —285.** Development of effective Protein A resin sanitization and storage solutions. **D. L. Dong**, L. Kalola, M. Sheedy, S. Zacharda, S. Dy, M. Patel, I. Ford, N. Quinlan, P. Alred, P. Alfonso

**2:45 —** Intermission.

**3:05 —286.** Use of chaotropic agents to recover functional protein from aggregates using Protein A chromatography. **D. M. Didio**, X. Xu, J. L. Hickey, S. S. Lee, S. Ghose

**3:30 —287.** Reduction of host cell DNA using charged filters at Protein A capture for monoclonal antibody production. **J. M. Wesner**, J. A. Lepore, D. L. Gill, L. R. Bink, S. Peters, J. Drewicz

**3:55 —288.** Designing quality into the process: Starting with the end in mind. **R. S. Blackmore**

Section D

Philadelphia Marriott -- Franklin 8

### **Emerging Technologies: Synthetic Biology**

*Cosponsored by HEALTH*

C. A. Voigt and T. S. Gardner, *Organizers*

**1:30 —289.** Synthetic biology: From programming bacteria to programming stem cells. **R. Weiss**

**2:10 —290.** An externally-tunable bacterial band-pass filter for enzymatic activity. T. Sohka, R. A. Heins, R. M. Phelan, J. Greisler, C. A. Townsend, **M. Ostermeier**

**2:30 —291.** DNA as a universal substrate for chemical kinetics. **G. Seelig**, D. Soloveichik, E. Winfree

**2:50 —** Intermission.

**3:05 —292.** Engineering microbial production of glucuronic and glucaric acids. **T. S. Moon**, S -H. Yoon, K. Jones Prather

**3:25 —293.** Genome-scale model of a minimal organism: *Mycoplasma genitalium*. **P. F. Suthers**, M. S. Dasika, V. Satish Kumar, C. D. Maranas

**3:45 —294.** Programming biomolecular self-assembly pathways. **P. Yin**, H. M. Choi, C. R. Calvert, N. A. Pierce

**4:05 —295.** Use of an expanded genetic alphabet in nested and multiplex PCR. **Z. Yang**, A. M. Sismour, P. Sheng, S. A. Benner

Section E

Philadelphia Marriott -- Grand Blrm Salon H

### **Industrial Biotechnology Awards Lecture**

W. Zhou, *Organizer*

**12:30 —296.** Realizing the vision of biology over steel: Wyeth BioPharma's strategy for platform process development . **J. S. Deetz**

### **Exploring Protein Structure and Function Using Unnatural Amino Acids**

*Sponsored by BIOL, Cosponsored by BIOT and HEALTH*

### **Probe Development in Molecular Imaging and Therapy**

#### **Optical Probes**

*Sponsored by INOR, Cosponsored by BIOT, NUCL, and HEALTH*

### **RNA Folding and Function**

*Sponsored by BIOL, Cosponsored by BIOT, PHYS, and HEALTH*

**TUESDAY EVENING**

## Probe Development in Molecular Imaging and Therapy

*Sponsored by INOR, Cosponsored by BIOT, NUCL, and HEALTH*

### WEDNESDAY MORNING

Section A

Philadelphia Marriott -- Grand Blrm Salon K

#### Upstream Processing: Recent Advances in Biocatalysis

*Cosponsored by HEALTH*

A. Lewandowski and H. Zhao, *Organizers*

**8:30 — 297.** Efficient production of L-ribose with a recombinant *E. coli*. **R. Woodyer**, M. Racine, D. C. Demirjian, B. C. Saha

**8:55 — 298.** Hyperthermophilic sugar isomerases and epimerases for biocatalytic interconversion of commodity and rare monosaccharides. **J. M. Harris**, K. L. Epting, S. Blumer-Schuetz, R. M. Kelly

**9:20 — 299.** Engineering bacteria for the production of human drug metabolites. **J. E. Prior**, U. Christians, R. T. Gill

**9:45 —** Intermission.

**10:05 — 300.** Highly stable formate dehydrogenase/cofactor reaction system encapsulated in phospholipid vesicles. **M. Yoshimoto**, R. Yamasaki

**10:30 — 301.** Stabilization of glucose dehydrogenase. **E. Vazquez-Figueroa**, V. Yeh, J. M. Broering, J. Chaparro-Riggers, K. M. Polizzi, A. S. Bommarius

**10:55 — 302.** Enantiocomplementary enzymes: Classification, molecular basis for their reversed enantioselectivity and prospects for mirror-image biotransformations. **R. J. Kazlauskas**

Section B

Philadelphia Marriott -- Grand Blrm Salon H

#### Biophysical & Biomolecular Symposium: Targeted Delivery of Proteins and Nucleotides

##### In Vivo Delivery and Imaging

*Cosponsored by HEALTH*

B. S. Vig and Y. J. Kwon, *Organizers*

**8:30 — 303.** Scintigraphic imaging of *KRAS* mRNA in human pancreas cancer xenografts with

( $[^{111}\text{In}]\text{DO3A}$ )<sub>n</sub>-poly(diamidopropanoyl)<sup>m</sup>-PNA-D(Cys-Ser-Lys-Cys) hybridization probes. **N. V. Amirkhanov**, K. Zhang, M. R. Aruva, M. L. Thakur, E. Wickstrom

**8:55 — 304.** Engineering polymers for DNA vaccine delivery. **C. Wang**

**9:20 — 305.** Targeted delivery of oligonucleotides for antileukemia therapy using multifunctional immunolipopolyplex nanocarriers. **Y. Jin**, B. Yu, S. Liu, X. Zhang, R. Lapalombella, G. Triantafyllou, J. Pang, N. Muthusamy, L. J. Lee, J. C. Byrd, G. Marcucci, R. J. Lee

**9:45 —** Intermission.

**10:05 — 306.** Delivery of SOD and siRNA with polyketal-microparticles to treat acute liver failure. **S. C. Yang**, S. Lee, C -Y. Kao, M. Heffernan, N. Murthy

**10:30 — 307.** Pharmacokinetic model for the distribution of radiometal-chelator-dendrimer-PNA-IGF1 analog nanoparticles in tumor-bearing mice. **A. W. Opitz**, N. V. Amirkhanov, K. Zhang, M. L. Thakur, E. Wickstrom, N. J. Wagner

**10:55 — 308.** Ligand-targeted delivery of therapeutic siRNA-containing nanoparticles: From laboratory to clinic. **S. M. Rele**, J. Y -C. Liu, Y. Liang, R. K. Zeidan, J. D. Heidel, M. E. Davis

## Section C

Philadelphia Marriott -- Grand Blrm Salon L

### Downstream Processing: Modeling

T. M. Przybycien and J. T. McCue, *Organizers*

**8:30 — 309.** Modeling buffer preparation operations for downstream processing. **C. A. Siletti**, D. Petrides

**8:55 — 310.** Charged ultrafiltration membranes in protein purification. **M. R. Etzel**, S. Bhushan

**9:20 — 311.** Protein-multimodal ligand docking simulations in solution and resin systems. **A. S. Freed**, W. K. Chung, Y. Hou, S. Dekat, K. V. Lakshmi, G. Makhatadze, S. Garde, S. M. Cramer

**9:45 —** Intermission.

**10:05 — 312.** Screening and modeling of Protein A affinity chromatography: Capture and purification of monoclonal antibodies. **M. Teeters**, T. Benner, D. Bezila, H. Shen, A. Velayudhan, P. Alred

**10:30 — 313.** Large scale process chromatography column modeling. **C. Antoniou**, B. Bell

**10:55 — 314.** Process modeling to integrate cost reduction and throughput increase. **C. Han**, S. Angepat, R. Brake, V. Bulusu

## Section D

Philadelphia Marriott -- Grand Blrm Salon I

## **Emerging Technologies: Nanobiotechnology**

J -I. Hahm and D. M. Lynn, *Organizers*

**8:30 —315.** Engineering mucus penetrating particles for transmucosal delivery. **S. K. Lai**, Y -Y. Wang, J. Hanes

**8:55 —316.** Integrating polyelectrolyte multilayers and microcontact printing for patterned siRNA delivery. **S. Mehrotra**, I. Lee, C. Chan

**9:20 —317.** Nanofabricated polymeric membranes in new generation in vitro models of the blood brain barrier. **G. Shayan**, M. Chatzichristidi, M. Shuler, E. Shusta, C. Ober, K. H. Lee

**9:45 —** Intermission.

**10:05 —318.** Stem cell, gene, and cancer therapies with bioactive nanostructures. **S. I. Stupp**

**10:45 —319.** Cytochrome c adsorption to silica nanoparticles: Effect of nanoparticle size and surface curvature on protein structure, function, and stability. **J. H. Nuffer**, W. Shang, R. W. Siegel, J. S. Dordick

**11:10 —320.** Deciphering bacterial communication using multimodular biological nanofactories in a microfluidics device. **R. Fernandes**, X. Luo, G. W. Rubloff, W. E. Bentley

Section E

Philadelphia Marriott -- Grand Blrm Salon J

## **Stem Cells: Engineering the Embryonic and Adult Stem Cell Niche**

*Cosponsored by HEALTH*

L. Li and W. L. Murphy, *Organizers*

**8:30 —321.** Stem cell niche, signaling, and expansion. **L. Li**

**9:10 —322.** Effects of fluid shear stress on embryonic stem cells. **T. Ahsan**, R. Nerem

**9:30 —323.** Scale-up and long-term expansion of embryonic stem cells in suspension and fibrous bed bioreactors. **N. Liu**, S -T. Yang

**9:50 —** Intermission.

**10:05 —324.** Microporous membrane-based indirect co-culture system for human embryonic stem cell propagation. K. Albert, S. Sheridan, L. Laurent, J. Loring, **R. Rao**

**10:25 —325.** Stem cell differentiation to muscle induced by a suitably compliant microenvironment. T. Chaudhuri, F. Rehfeldt, H. L. Sweeney, **D. E. Discher**

**10:45 —326.** Chitosan membrane for osteoblast differentiation. **K. Narayanan**, A. C. Wan, J. Y. Ying

## WEDNESDAY AFTERNOON

Section A

Philadelphia Marriott -- Grand Blrm Salon K

### **Upstream Processing: Advances in Microbial Fermentation Process Development**

*Cosponsored by HEALTH*

M. Castellanos and S. Bhargava, *Organizers*

**1:30 —327.** Functional overexpression of lipase in *Escherichia coli*. **C. P. Chou**

**1:50 —328.** Fast development of *Pichia pastoris* cultures based on hybrid semiparametric process control. **A. R. Goerke**, J. Scholten, N. E. Altaras, A. Teixeira, J. Clemente, A. Cunha, R. Oliveira, J. G. Aunins

**2:10 —329.** Hypersecretion of recombinant proteins in *E. coli* by translation engineering. **P. Gupta**, K. H. Lee

**2:30 —330.** Carbon effects for a novel inducible fermentation producing recombinant therapeutic proteins as inclusion bodies. **M. Berge**

**2:50 —** Intermission.

**3:05 —331.** Finding conditions to untangle the recombinant protein inclusion body mess in *Escherichia coli*. **M. A. Salazar**, S. W. Harcum

**3:25 —332.** Role of the putative autophagy protein Atg13 in filamentous fungi during nutrient starvation. **J. Kadarusman-Pollack**, Y. Kim, Z. Li, S. Harris, M. R. Marten

**3:45 —333.** In-depth analysis of fermentation aeration through the use of computational fluid dynamics. **M. R. Johnson**, S. Joshi, M. Horner, C. Hickey, A. Agarwal

**4:05 —334.** Process development and modeling of *Propionibacterium acidipropionici* for enhanced propionic acid fermentation. **A. Zhang**, S -T. Yang

Section B

Philadelphia Marriott -- Grand Blrm Salon H

### **Biophysical & Biomolecular Symposium: Protein Folding And Biophysical Characterization**

*Cosponsored by BIOL and HEALTH*

M. E. M. Cromwell and K. Mallela, *Organizers*

- 1:30 —335.** Synonymous mutations and ribosome stalling can lead to altered folding pathways and distinct minima. **R. Nussinov**, C -J. Tsai, Z. Sauna, C. Kimchi-Sarfati, S. Ambudkar, M. Gottesman
- 1:50 —336.** Exploring the energy landscape of human lysozyme toward an elucidation of the molecular mechanism of systemic amyloidosis. **A. Dhulesia**, J. R. Kumita, D. Nietlispach, X. Salvatella, C. M. Dobson
- 2:10 —337.** Oxidative folding of onconase, a member of the ribonuclease family: A kinetic and thermodynamic study. **R. F. Gahl**, H. A. Scheraga
- 2:30 —338.** High hydrostatic pressures as a tool to recover folded protein from aggregates and inclusion bodies. **T. W. Randolph**
- 2:50 —** Intermission.
- 3:05 —339.** Alternative folded states separate monomeric from oligomeric  $\beta$ -2 microglobulin. **A. Miranker**
- 3:25 —340.** Increasing immunoglobulin concentration modulates the conformational heterogeneity, bonding network and molecular interactions that influence solution properties. **T. J. Kamerzell**, J. Liu, S. J. Shire, Y. J. Wang
- 3:45 —341.** Cys shotgun labeling to probe protein unfolding in solution and in normal and diseased cells. **J. D. Pajerowski**, C. Carag, D. E. Discher
- 4:05 —342.** Peptide tertiary structure nucleation by sidechain crosslinking with metal complexation and double "click" cycloaddition. O. Torres, D. Yuksel, M. Bernardina, K. Kumar, **D. Bong**

Section C

Philadelphia Marriott -- Grand Blrm Salon H

### **BIOT Young Investigator Award Lecture**

*Cosponsored by HEALTH*

W. Zhou, *Organizer*

- 5:00 —343.** Directed evolution for fun and profit. **H. Zhao**

Section C

Philadelphia Marriott -- Grand Blrm Salon L

### **Downstream Processing: Use of Host Cell Protein for Metabolite Profiling in Downstream Process Analysis and Design**

*Cosponsored by HEALTH*

J. P. Thommes and R. R. Beitle, *Organizers*

- 1:30 —344.** Predicting ion-exchange behavior from 3-D characterization of proteins. **L. Xu**, C. E. Glatz



**1:55 —345.** Generation and clearance of protein A fragments during antibody purification. **J. Carter-Franklin**, C. Vicia, P. McDonald, R. Fahrner

**2:20 —346.** Development of chromatography process design database from crude mixture of proteins. T. Ahamed, B. K. Nfor, L. A. M. van der Wielen, P. D. E. M. Verhaert, G. W. K. van Dedem, M. H. M. Eppink, E. J. A. X. van de Sandt, **M. Ottens**

**2:45** — Intermission.

**3:05 —347.** Design of recombinant strains based on host cell elution profiles. **Z. Liu**, P. Bartlow, R. Koepsel, R. Haley, R. R. Beitle, M. M. Ataa

**3:30 —348.** Profiling of host cell proteins by 2-D difference gel electrophoresis (2-D-DIGE): Application in downstream process development. N. Szapiel, **M. Jin**, J. L. Hickey, S. Lee, S. Ghose

Section D

Philadelphia Marriott -- Grand Blrm Salon I

### **Emerging Technologies: Nanobiotechnology**

J -I. Hahm and D. M. Lynn, *Organizers*

**1:30 —349.** Programming molecular tube circumferences. **P. Yin**, R. F. Hariadi, S. Sahu, H. M. Choi, S. Park, T. H. LaBean, E. Winfree, J. H. Reif

**1:50 —350.** Multicomponent molecular detection of breast cancer cells using nanotube electronic devices specific for cell surface receptors. N. Shao, **E. Wickstrom**, B. Panchapakesan

**2:10 —351.** Fast detection of protein cancer markers and HIV antigen using microfluidic-based surface immobilized biobarcode assay. **L. Wang**, E. D. Goluch, H. D. Hill, S. J. Hurst, E -Y. Kim, C. A. Mirkin, C. Liu

**2:30 —352.** Near real-time antibody quantification via plasmonic enhancement of a sandwich fluoroimmunoassay. **D. S. Smith**, H. Szmazinski, M. A. Hanson, Y. Kostov, J. R. Lakowicz, G. Rao

**2:50** — Intermission.

**3:05 —353.** Dissecting Ephrin A1-EphA2 signaling in breast cancer. **P. M. Nair**, K. Salaita, R. M. Neve, J. W. Gray, J. T. Groves

**3:25 —354.** An emerging technology for the fundamental problem of immunocompatibility: The body's own means of "self" recognition. R. Tsai, P. Rodriguez, **D. E. Discher**

**3:45 —355.** Self-interaction nanoparticle spectroscopy: A nanoparticle-based protein interaction assay. A. Bengali, **P. M. Tessier**

**4:05 —356.** Mechanical nanosensor based on a thermophilic thermosome: En route to self-reporting biomaterials . **N. Bruns**, K. Pustelny, D. S. Clark

## WEDNESDAY EVENING

Section A

Pennsylvania Convention Center -- Hall C

### Poster Session

### Upstream Processing

H. Shen, Y. Lei, and H. Yi, *Organizers*

**6:00 - 8:00**

**357.** Impact of medium formulation on stable MAb expression. **A. Levine**, P. Duncan, E. Sendarek, C. Ranucci

**358.** Effects of microsparger surface area and pore size on mass transfer in a development bioreactor. **C. Wood**, T. Kurniawati, S. Ozturk

**359.** Biochemical characterization of phosphoglucosyltransferase from *Clostridium thermocellum*. **Y. Wang**, Y -H. P. Zhang

**360.** Coexpression of *Arabidopsis thaliana* phytochelatin synthase and *Treponema denticola* cystalysin leads to enhanced arsenic accumulation. **S -L. Tsai**, S. Singh, N. A. Da Silva, A. Mulchandani, W. Chen

**361.** Discovering the regulatory hubs of *Streptomyces* secondary metabolism through transcriptome data mining. **S. Charaniya**, M. Castro, S. Sui, G. Karypis, W -S. Hu

**362.** FSscan: A program to identify +1 frameshifting hot spots in *Escherichia coli* genome. **P -Y. Liao**, R. S. Kuczynski, K. H. Lee

**363.** Metabonomics: Roles in mammalian cell culture process understanding and optimization. **N. Ma**

**364.** Using a novel 24-well microplate in high-throughput development of serum-free suspension cell culture. **Y. Wen**, N. Liu, X. Zhang, S -T. Yang

**365.** Application of on-line scanning dielectric spectroscopy to monitor CHO cell cultures. **C. Opel**, A. Amanullah

**366.** CFD modeling of gas transfer in bioreactors. **W. J. Kelly**

**367.** Denitrifying fermentation technology: Rhamnolipid production from biodiesel byproduct glycerol. **N. M. Pinzon**, **L -K. Ju**

- 368.** Development of a cell culture production platform for cold-adapted live attenuated influenza vaccine (CAIV) strains of FluMist<sup>®</sup>: Medium fortification and process intensification strategies for improving bioreactor productivity. M. George, X. Shi, T. Dang, **K. Aggarwal**, R. Schwartz, J. Liu, L. Maranga
- 369.** Enhanced hydrogen production from glucose and xylose by *C. tyrobutyricum*. **Y. Zhang**, S -T. Yang
- 370.** Evaluation and implementation of a fully automated bioreactor sampling system for on-line cell counting, metabolite analysis, and HPLC amino acid analysis. **E. Y. Yu**, K. Davis, G. Barringer, S. A. Casnocha
- 371.** Implementation of a high yield chemically defined process in a bench scale bioreactor. **E. Rustandi**, Y -M. Huang, W. Hu, H. Yusuf-Makagiansar, T. Ryll
- 372.** Maintenance of a cell culture inoculum source. **K. Mills**, K. Johnson, L. Pollastrini, L. Emerick
- 373.** Proteomics and genome sequencing to enhance CHO cell productivity. **J. C. Swanberg Jr.**, K. H. Lee
- 374.** Recombinant antibody production from fed-batch cell culture using Revolution<sup>™</sup> engineered CHO DG44. **X. Liu**, P. Ravnkar, F. Wu
- 375.** Enhancing Succinic acid production by improving fitness of *E.coli* production strains. **A. Singh**, R. T. Gill
- 376.** Optimization of autoinducible protein expression in Escherichia coli. **K. Wang**, C -Y. Tsao, W. E. Bentley
- 377.** An evaluation of quantitative PCR for determining copy number of recombinant expression vectors in bacterial, yeast and mammalian systems, and its use in establishing genetic stability during culture. **S. F. Feng**, P. Duncan
- 378.** Bacterial band-pass filter for enzymatic activity: Bacterial growth patterning. **T. Sohka**, R. A. Heins, R. M. Phelan, J. Greisler, C. A. Townsend, M. Ostermeier
- 379.** Benefits and limitations of rocking motion reactors in a process development environment. **K. Kothary**, G. E. Derfus, J. Dizon-Maspat, T. Hudson
- 380.** Cellulase production by continuous culture of *Hypocrea jecorina* Rut C30 using acid hydrolysate prepared to retain more oligomers for induction. C -M. Lo, **L -K. Ju**
- 381.** Characterization of a shake flask model for cultivation of CHO cells. **J. D. Raley**, O. Lara-Velasco
- 382.** Conversion of a complex cultivation medium into a chemically defined protein-free medium for cultivation of CHO cells and production of monoclonal antibodies. **L. K. Bentley**, J. Park, D. Chauliac, S. F. Smith, K. Listner, L. Chu, M. Chartrain
- 383.** Development of a hydrolysate-free CHO cell platform process. **S. Oshodi**, D. E. Pascoe, I. H. Yuk
- 384.** Effect of molasses concentration on fermentative biohydrogen production in attached growth system. **J. Tang**, N. Ren, W. Liu

- 385.** Exploiting the potential of the RpoS phenotype via an inducible small RNA expression system. **K. Carter**, W. E. Bentley
- 386.** Immobilized Cytochrome P450 enzyme constructs: A potential bioreactor application. **L. Wollenberg**, J. L. Kabulski, M. Yang, N. Wu, M. Powell, L. Martin, N. Thomsen, T. S. Tracy, P. M. Gannett
- 387.** Improvement of dark fermentation of biohydrogen production by release of acetic acid inhibition. **J. Tang**, N. Ren, W. Liu
- 388.** Kinetics of butanol fermentation by *Clostridium acetobutylicum* in multiple-step fibrous bed bioreactor. **W -L. Chang**, S -T. Yang
- 389.** Media optimization for morphology control and fumaric acid production by *Rhizopus oryzae* in free and immobilized cell fermentations. **Z. Wang**, S -T. Yang
- 390.** One-step oligonucleotide purifications using anion-exchange chromatography resins. **P. T. Duong**, S. Nakatani, J. K. O'Donnell
- 391.** Oxygen transfer characterization of process scouting devices using a noninvasive optical sensor. **J. Vallejos**, K. Brorson, A. R. Moreira, G. Rao
- 392.** Refinement of pilot-scale models of mammalian cell expansion and robotic roller-bottle processing for comparison to full scale manufacturing. **J. Warren**, A. Druckenmiller, F. Lu, N. Sosale, G. Maheshwari
- 393.** Simple protein purification through affinity adsorption on regenerated amorphous cellulose followed by intein self-cleavage. J. Hong, **Y. Wang**, X. Ye, Y -H. P. Zhang
- 394.** The influence of process configurations and nitrogen contents on the sorghum fermentation at very-high-gravity conditions. **K -J. Duan**, L -Y. Huang, J -W. Chang, Y -H. Lin
- 395.** Transient in planta expression of cellulose-degrading enzymes: Plant tissues as bioreactors. **B. Lindenmuth**
- 396.** Tuning cell cycle of insect cells for enhanced protein production. **H -C. Wu**, **W. E. Bentley**

Section B

Pennsylvania Convention Center -- Hall C

## Poster Session

### Emerging Technologies

H. Shen, Y. Lei, and H. Yi, *Organizers*

**6:00 - 8:00**

- 397.** Application of synthetic vesicle fusion to cellular delivery by small molecule recognition. **Y. Gong**, D.

Bong

- 398.** Application of whole-column detection capillary isoelectric focusing technique in protein formulation development. **N. Li**, L. Bass, W. Wang
- 399.** Assembly and disassembly of DNA-gold nanopores. **S. Lim**, L. Wang, U. Chandrachud, M. Kamundi, R. Loukrakpam, S. Gal, C -J. Zhong
- 400.** Au-bound P450 platform: An in vitro tool for predicting in vivo drug metabolism. **J. L. Kabulski**, L. Wollenberg, M. Yang, N. Wu, N. Thomsen, T. S. Tracy, P. M. Gannett
- 401.** Biologically programmed synthesis of hybrid semiconductor CdSe/ZnS nanocrystals. **S. Singh**, N. Myung, A. Mulchandani, W. Chen
- 402.** Delivery of protein and DNA mediated by strong impulsive magnetic field. **W -C. Lee**, C -B. Chen, J -Y. Chen, C -H. Lee
- 403.** Developing photostable and biocompatible single nanoparticle probes for in vivo imaging of early development of zebrafish embryos. **L. M. Browning**, K. J. Lee, T. Huang, P. D. Nallathamby, J. E. Lowman, X. N. Xu
- 404.** Intelligent thermosensitive cationic diblock copolymers for multimodal gene delivery. **T -H. H. Chen**, Y. Bae, D. Y. Furgeson
- 405.** Layer-by-layer engineering approach for in vivo targeting delivery of siRNA. O. Taratula, **H. He**
- 406.** Multifunctional protein mimics for the delivery of peptides and oligonucleotides. **S. K. Hamilton**, C. Wallen, E. Harth
- 407.** Novel linker technology for surface immobilization of proteins on self-assembled monolayers. **M. K. Strulson**, J. A. Maurer
- 408.** Synthesis and analysis of combinatorial libraries using integrated microfluidic chips. **B. R. Schudel**, B. T. Cunningham, P. J. A. Kenis, C. Choi
- 409.** Temperature dependent diffusion of DNA escaping from a protein nanopore using AC readout. **A. D. Hibbs**, D. K. Lathrop, G. A. Barrall, E. N. Ervin, M. G. Keehan, M. A. Krupka, H. S. White, R. Kawano
- 410.** A synthetic approach to stop Codon scanning mutagenesis. **L. Nie**, J. Lavinder, T. J. Magliery
- 411.** Novel vaccine strategy via the orthogonal inactivation of enveloped viruses using a bifunctional hydrophobic crosslinker and detergent treatment. **J. M. Leiston-Belanger**, Y. Raviv, M. Viard, J. W. Bess Jr., R. Blumenthal
- 412.** Boron dipyrromethene as a caging group photolyzed with 500 nm green light. **N. Umeda**, Y. Urano, T. Nagano
- 413.** Chemoenzymatic synthesis of the optically active adrenaline crown ethers. T. Kijima, **F. Sasaki**, Y. Watanabe, T. Izumi, M. Watanabe

- 414.** Facile fabrication of biopolymeric optical waveguides. **A. K. Manocchi**, P. Domachuk, F. G. Omenetto, H. Yi
- 415.** Functional glyco-affinity macroligand: Design, synthesis and application. **S. Chalagalla**, X -L. Sun
- 416.** Microalgae culture on wastewater and flue gases for biomass feedstock and nitrate and phosphate ions removed. **Q. Kong**, B. Martinez, L. Li, P. Chen, R. Ruan
- 417.** Selective prodrug activation using protein switch technology. **C. M. Wright**, M. Ostermeier
- 418.** Whey protein fractionation using supercritical carbon dioxide. **L. M. Bonnaille**, P. M. Tomasula
- 419.** A screening of phage displayed peptides for the recognition of fullerene. **Y. Morita**
- 420.** Advances in sub-cloning using high-throughput bioreactors. **B. Kondragunta**, J. Drew, K. Brorson, A. R. Moreira, G. Rao
- 421.** Application of multivariate analysis to continuous long-term cell culture processes. **J. L. Barker**, J. Swamy, C. W. Buser
- 422.** Applications of the SimCell™ System as a high-throughput microbioreactor platform. **A. P. Russo**
- 423.** Binding proteins as potential sensors for real- time monitoring of glucose and glutamine in mammalian cell culture using microdialysis. **A. Sriram**, K. Mupparapu, X. Ge, G. Rao, L. Tolosa
- 424.** Characterization and purification of bacteriophages using chromatofocusing. **S. Lute**, H. Shen, K. Brorson, D. Frey
- 425.** Co-encapsulation of *Saccharomyces cerevisiae* and enzymes for the efficient fermentation of D-Xylose in the production of fuel ethanol from cellulosic biomass. B. Frederick, **S. Andreescu**
- 426.** Colloidosomes: "Smart" materials for biomedical applications. **R. T. Rosenberg**
- 427.** Development of a high power density enzyme fuel cell using a laccase biocathode. **A. P. Borole**, S. LaBarge
- 428.** Development of serum-free media for embryonic stem cells using experimental design. **N. Liu**, S -T. Yang
- 429.** Effects of carbon nanotube on DRG neuron culture. **K. Matsumoto**, C. Sato, R. Whitby, N. Shimizu
- 430.** Efficacy evaluation of antibiotic-containing nanoparticles against *Pseudomonas aeruginosa*, a major cause of human lung infections. **M. W. Chang**, K. Hadinoto
- 431.** Electricity production from paper recycling wastewater in continuous-flow microbial fuel cells. L. Huang, **S. Cheng**, B. E. Logan
- 432.** Electrochemical biosensors for cisplatin detection. **J. E. Jett**, N. Wu, H. Li, P. M. Gannett
- 433.** Elucidating mechanisms of acetate tolerance in *E. coli* using SCALES. **N. R. Sandoval**, R. T. Gill

- 434.** Evaluating biopharmaceutical economics and capacity with process simulation tools. **C. Siletti**, D. Petrides
- 435.** Evaluation and implementation of in-line dilution using buffer concentrates in column chromatography. **J. Dizon-Maspat**, D. Myers, D. Grant, T. Hudson
- 436.** Evaluation of downstream process analytical technology (PAT) in Mab production. **S. Dermawan**, A. Sharma, A. S. Rathore
- 437.** Evaluation of production of bioethanol and biodiesel from renewable resources using process simulation tools. **D. Petrides**, C. Siletti
- 438.** Facilitating bioprocess scale-up and technology transfer with computer aids. **D. Petrides**, C. Siletti
- 439.** Hierarchically assembled viral-synthetic hybrid microparticles for high throughput sensing. **C. L. Lewis**, W. S. Tan, D. C. Pregibon, N. E. Horelik, P. S. Doyle, H. Yi
- 440.** Identification of beta-glucosidase mutants with improved thermostability by a novel selection/screening method. **W. Liu**, J. Hong, Y -H. P. Zhang
- 441.** Isolation of neurons differentiated from mouse ES cells using nerve growth factor-coated nanoscale magnetic beads. **A. Kitazawa**, N. Shimizu
- 442.** Methane production from dairy waste anaerobic digestion: Evaluation of mixing behaviors of digester and its implication on methane production. **Z. Wen**
- 443.** Monitoring of shake flask fermentation using triple noninvasive sensors. **X. Ge**, Y. Kostov, G. Rao
- 444.** Novel DNA staining technique employing gold phosphine salts: Application for nanowire synthesis. **J. Samson**, C. M. Drain, P. Nahirney
- 445.** Plant cell suspension cultures as a bioproduction platform of recombinant human therapeutic proteins. **T -K. Huang**, M. A. Plesha, B. Falk, A. M. Dandekar, K. A. McDonald
- 446.** Preparation of protein microspheres for biocatalytic application. **Y. Wang**
- 447.** Production planning, scheduling, and debottlenecking practices in the biopharmaceutical industries. **C. Siletti**, D. Petrides

## **THURSDAY MORNING**

Section A

Philadelphia Marriott -- Grand Blrm Salon C/D

**Upstream Processing: Applications of Systems Biology to Upstream Process Development**

*Cosponsored by HEALTH*

R. Radhakrishnan and J. D. Varner, *Organizers*

**8:30 —448.** Uncovering hyperproductivity gene-trait relationships through transcriptome data mining. **A. Kantardjieff**, S. Charaniya, J. C. Yee, W -S. Hu

**8:55 —449.** Hyperosmotic stress responses in mammalian cells: A comparative microarray study of hybridoma and CHO cell responses. **S. T. Sharfstein**, D. Shen, T. R. Kiehl, S. F. Khattak, Z. Li, S. S. Lee, A. He, I. M. Neuhaus, P. S. Kayne, V. Patel

**9:20 —450.** Controlling the proteome: Is the transcriptome sufficient? **R. S. Kuczenski**, K. H. Lee

**9:45 —** Intermission.

**10:05 —451.** Closing the circuit: Toward network-based identification of drug-sensitivity and resistance mechanisms. J. Purvis, V. Ilango, **R. Radhakrishnan**

**10:30 —452.** Modeling and analysis of eukaryotic translation initiation reveals the fragility of PI3K/Akt/mTOR subsystem. **S. Nayak**, J. K. Siddiqui, J. D. Varner

**10:55 —453.** Understanding the Endoplasmic Reticulum's critical role in heterologous protein expression. **D. Raden**, A. S. Robinson

Section B

Philadelphia Marriott -- Grand Blrm Salon I/J

### **Biophysical & Biomolecular Symposium: Characterization Of Covalent Modifications In Proteins**

*Cosponsored by BIOL and HEALTH*

J. Vlasak and C. Schoneich, *Organizers*

**8:30 —454.** Functional implications of IgG2 disulfide isoforms. **M. Ricci**, T. Dillon, C. Vezina, G. C. Flynn, D. Y. Liu, D. Rehder, M. Plant, B. Henkle, Y. Li, S. Deechongkit, B. Varnum, J. Wypych, A. Balland, P. Bondarenko

**9:10 —455.** Characterization of human IgG2 disulfide isoforms. **T. M. Dillon**, M. Speed Ricci, C. Vezina, G. C. Flynn, Y. D. Liu, D. S. Rehder, M. Plant, B. Henkle, Y. Li, S. Deechongkit, B. Varnum, J. Wypych, A. Balland, P. V. Bondarenko

**9:30 —456.** Peptide cysteine thiyl radicals abstract hydrogen atoms from surrounding amino acids: The photolysis of a cystine containing model peptide. **B. A. Kerwin**, O. Mozziconacci, V. Sharov, T. D. Williams, C. Schoneich

**9:50 —** Intermission.

**10:05 —457.** Mechanisms of thiol oxidation and hydrogen transfer reactions in peptides and proteins. **C. Schöneich**, W. Koppenol, T. Nauser

**10:25 —458.** Novel approach for detecting sulfenic acid-modified proteins in living cells. **Y. H. Seo**, K. G. Reddie, W. B. Muse III, S. E. Leonard, K. S. Carroll



**10:45 —459.** Identification and characterization of diastereomers in antibodies using methionine sulfoxide reductase. **H. K. Khor**, G. C. Chu, M. E. Jacoby, T. C. Squier, D. Chelius

**11:05 —460.** Stability and structure changes as a consequence of methionine oxidation of IgG1 Fc region. **D. Liu**

## Section C

Philadelphia Marriott -- Grand Blrm Salon K

### **Emerging Technologies: Fuel Biotechnology**

Y -H. P. Zhang and G. Sriram, *Organizers*

**8:30 —461.** Metabolic engineering for branched-chain higher alcohols as biofuels. **J. C. Liao**

**9:10 —462.** Understanding and harnessing microbial fermentation of glycerol: A new path to biofuels and biochemicals. **R. Gonzalez**

**9:30 —463.** Identification of networks perturbed by isobutanol and butanol toxicity. **M. P. Brynildsen**, J. C. Liao

**9:50 —** Intermission.

**10:05 —464.** Evaluation and testing of ionic liquid pretreatments on targeted biomass feedstocks. **B. A. Simmons**, S. Singh, D. Dibble, B. Holmes, M. Auer, D. Jorgens, J -L. Faulon

**10:25 —465.** SSCF of paper sludge using recombinant xylose-fermenting microbes. **J. Zhang**, L. R. Lynd

**10:45 —466.** Bioenergy generation from cellulose in single-chamber microbial cells (MEC,MFC). **S. Cheng**, D. Xing, B. E. Logan

**11:05 —467.** Biocatalyst and engineering optimization of anode to develop high power density microbial fuel cells. **A. P. Borole**, C. Y. Hamilton, D. Aaron, C. Tsouris

## Section D

Philadelphia Marriott -- Grand Blrm Salon L

### **Downstream Processing: BioProcess Integration Case Studies**

Y. Lu and W. J. Kelly, *Organizers*

**8:30 —468.** Case study: Fitting a difficult monoclonal antibody into a platform process while maintaining timelines. **E. DiBella**, J. Richter, A. Arbutina, F. Meacle, P. Alred

**8:55 —469.** Downstream processing of an antibody based biologic produced at 15 000 L scale involving purification of drug substance from a feedstock containing fifty percent product related impurities. **D. R. H. Evans**

**9:20 —470.** High throughput process development: Development of chromatographic steps for removal of aggregates in an antibody purification process. **K. Nilsson-Välilmaa**, G. Rodrigo, C. Engstrand, A. Forss, K. M. Lacki

**9:45 —** Intermission.

**10:05 —471.** Isolation and characterization of DNA from cell culture bioreactors for evaluation of clearance across various purification unit operations. **A. Lewis**

**10:30 —472.** Process interactions in the clearance of host-cell DNA from adenovirus vectors. **J. O. Konz Jr.**, A. R. Goerke, M. E. Laska, S. L. Sagar

**10:55 —473.** Removal of beta-glucans from solutions by filtration with Posidyne® filters. **E. Gefroh**, A. Hewig, Y. Lu, G. Vedantham

Section E

Philadelphia Marriott -- Grand Blrm Salon A

### **Stem Cells: Quantifying, Modeling, and Controlling Stem Cell Fate**

*Cosponsored by HEALTH*

R. Rao and T. C. McDevitt, *Organizers*

**8:30 —474.** Analysis and manipulation of embryonic stem cell fate decisions. **W. L. Stanford**

**9:10 —475.** Cell shape and adhesion regulate bmp-2-induced osteogenesis: Role of rhoa-dependent smad signaling. **Y. Wang**, C. S. Chen

**9:30 —476.** Fine-tuned hyaluronic acid hydrogels to mimic the softness of tissues. **F. Rehfeldt**, A. L. Zajac, S. Cai, D. E. Discher

**9:50 —** Intermission.

**10:05 —477.** Mechanisms of vascular differentiation from MSCs by PEGylated fibrin. G. Zhang, **L. J. Suggs**

**10:25 —478.** Matrix mechanics and cell traction regulate integrin-adhesion ligand bond formation by Mesenchymal stem cells in 3-D microenvironments. **N. D. Huebsch**, P. R. Arany, A. S. Mao, D. J. Mooney

**10:45 —479.** Parsing stem cell behaviors on complex biomaterials via high content imaging and modeling. **M. D. Treiser**, S. Gordonov, E. Yang, A. Joy, D. Cohen, D. Bolikal, I. Androulakis, D. D. Knight, J. Kohn, C. S. Chen, P. V. Moghe

**11:05 —480.** Silencing of tumor suppressor p53 promotes polyploidization and defers apoptosis during megakaryocytic differentiation. **P. A. Apostolidis**, P. G. Fuhrken, A. Duchoud, S. Lindsey, W. M. Miller, E. T. Papoutsakis

## THURSDAY AFTERNOON

Section A

Philadelphia Marriott -- Grand Blrm Salon C/D

### **Biophysical & Biomolecular Symposium: Protein Folding And Biophysical Characterization**

*Cosponsored by BIOL and HEALTH*

M. E. M. Cromwell and K. Mallela, *Organizers*

**1:30 —481.** Simple and complex salt bridges in globular proteins: Implications for protein folding and design. **G. Makhatadze**

**1:50 —482.** Enhancing production of complex mammalian proteins using *E. coli* based cell-free protein synthesis. **J. P. Welsh**, J. R. Swartz, J. Bonomo

**2:10 —483.** Microsecond acquisition of heterogeneous structure in the folding of a TIM barrel protein. Y. Wu, E. Kondrashkina, C. Kayatekin, C. R. Matthews, **O. Bilsel**

**2:30 —484.** Influence of nonlinear electrostatics on transfer energies between liquid phases: Charge burial is far less expensive than expected by Born model. H. Gong, G. Hocky, **K. F. Freed**

**2:50 —** Intermission.

**3:05 —485.** Revealing beta-amyloid structure at residue level via chemical modification, mass spectrometry and fluorescence spectroscopy. **I. Ramos**, T. A. Good

**3:25 —486.** Systematic convergence of REMD subreplicas: Insight into the structure and dynamics of the A $\beta$  peptide. **J. Z. Ruscio**, T. Head-Gordon

**3:45 —487.** Exploring the amyloid formation by cytochrome c. **R. L. Hutchings**, K. M. G. Mallela

**4:05 —488.** Biophysical characterization on the interactions between heparin/HS and proteins with biological significant using SPR. **F. Zhang**, R. J. Linhardt

Section B

Philadelphia Marriott -- Grand Blrm Salon I/J

### **Biophysical & Biomolecular Symposium: Characterization Of Covalent Modifications In Proteins**

*Cosponsored by BIOL and HEALTH*

J. Vlasak and C. Schoneich, *Organizers*

**1:30 —489.** New methodologies for analyzing deamidation in proteins. J. Cournoyer, X. Li, C. Lin, **P. O'Connors**

**1:55 —490.** Identification and characterization of charge variants of a humanized IgG1 monoclonal antibody. **J. Vlasak**, M. C. Bussat, S. Wang, E. Wagner-Rousset, M. Schaefer, C. Klinguer-Hamour, M. Kirchmeier, N. Corvaia, R. Ionescu, A. Beck

**2:20 —491.** Using kinetics to understand the degradation pathways of monoclonal antibodies. **R. M. Ionescu**, J. Vlasak

**2:45 —** Intermission.

**3:05 —492.** Effects of secondary structure on deamidation of the Fc portion of recombinant monoclonal antibody IgG. S. Sinha, L. Zhang, T. D. Williams, J. Vlasak, R. M. Ionescu, **E. M. Topp**

**3:30 —493.** Isomerization of a single aspartyl residue of anti-epidermal growth factor receptor (EGFR) immunoglobulin gamma 2 antibody highlights the role avidity plays in antibody activity. **P. V. Bondarenko**, D. S. Rehder, A. McAuley, T. M. Dillon, G. Xiao, J. Crouse-Zeineddini, L. Vardanyan, N. Perico, V. Mukku, D. Chelius, M. Matsumura, D. N. Brems

**3:55 —494.** Teasing out the degradation mechanisms in two monoclonal antibodies. **J. Ouyang**, N. Chen, O. Borisov, E. Ingham, T. Swartz, M. Nguyen, D. Nelson, M. Carnine, F. Jacobson

Section C

Philadelphia Marriott -- Grand Ballroom Salon K

### **Emerging Technologies: Fuel Biotechnology**

Y -H. P. Zhang and G. Sriram, *Organizers*

**1:30 —495.** Photosynthetic biofuels: Renewable in situ generation of hydrogen and hydrocarbons. **A. Melis**

**1:55 —496.** Activating and evolving hydrogenases for solar hydrogen production. **J. R. Swartz**, J. A. Stapleton, J. M. Kuchenreuther, P. Smith

**2:20 —497.** Biofuels production by cell-free synthetic enzymatic technology. **Y. Wang**, X. Ye, Y -H. P. Zhang

**2:45 —** Intermission.

**3:05 —498.** Conversion of cellulose fermentation end products to hydrogen in microbial electrolysis cells. **E. Lalaurette**, B. Logan

**3:30 —499.** Functional genomic and biochemical analysis of xylanolytic glycoside hydrolases in the biohydrogen-producing extremely thermophilic bacterium *Caldicellulosiruptor saccharolyticus*. **A. L. VanFossen**, D. L. Lewis, S. L. Zelin, J. D. Nichols, R. M. Kelly

**3:55 —500.** Analyzing the flux distribution in *Synechocystis* sp. PCC 6803 for improving biosolar hydrogen production. **F. W. Chaplen**, E. H. Burrows, R. L. Ely

Submit Final Program