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Education

Ph.D. 1999 Chemical Engineering, The University of Texas at Austin
B.S. 1993 Chemical Engineering, University of Minnesota, Minneapolis-St. Paul

Research Interests

Current research interests are focused on understanding and exploiting molecular recognition specificity for medical applications. To accomplish this, we have developed new protein engineering tools, fluorescent protein biosensors, and micro-systems devices for:

- Semi-automated affinity reagent isolation and engineering
- Development of peptide-based array diagnostic sensors
- Discovery of specific intracellular peptide aptamers
- Engineering of sequence-specific proteases
- Design and construction of multi-functional therapeutics

Appointments

07/01-present Assistant Professor, Department of Chemical Engineering
07/02-present Assistant Professor, Biomolecular Science and Engineering
03/03-present Team Leader, Institute for Collaborative Biotechnologies
99-01 Senior Research Fellow, Fred Hutchinson Cancer Center (Seattle, WA)
98-99 Visiting Engineer, SRI International (Menlo Park, CA)
93-99 Research Assistant, Chemical Engineering, University of Texas at Austin

Awards and Honors

2005 National Science Foundation Career Award
2005 Best Poster, AIChE National Meeting, (with M. Mena)
2005 Keynote Lecturer, FOSBE Meeting
2004 Best Poster Award, ICB-Industry Conference
2003 ICB Discovery Team Leader & Co-PI ICB
2003 Santa Barbara Cottage Hospital Research Award
2003 NIH Virology-Oncology Fellow, FHCRC

Publications

1. 1997 Display of Heterologous Proteins on the Surface of Microorganisms: From The Screening Of Combinatorial Libraries to Live Recombinant Vaccines, Georgiou, G., Stathopoulos, C., Daugherty, P.S., Nayak, A.R., Iverson, B.L., and Curtiss III, R. *Nature Biotechnology* 15:29-34.
2. 1998 Antibody Affinity Maturation Using Bacterial Surface Display,” Daugherty, P.S., Chen,G., Olsen, M.J., Iverson, B.L., and Georgiou, G. *Protein Engineering* 11:825-32.
3. 1999 Development of An Optimized Expression System for the Screening of Antibody Libraries Displayed on the E.Coli Surface, Daugherty, P.S., Olsen, M.J., Iverson, B.L., and Georgiou, G. *Protein Engineering.* 12:613-621
4. 2000 Quantitative Analysis of The Effect of Mutation Frequency on the Affinity Maturation of Single Chain Fv Antibodies,” Daugherty, P.S., Chen, G., Iverson, B.L., and Georgiou, G. *Proc. Nat. Acad. Sci.* 97:2029-2034.
5. 2000 Flow Cytometric Screening of Cell-Based Libraries,” Daugherty, P.S., Iverson, B.L., and Georgiou, G. *J. Immun. Methods.* 243, 211-227.
6. 2000 Function-Based Isolation of Novel Enzymes From a Large Library, Olsen, M.J., Stephens, D.L., Griffiths, D., Daugherty, P.S., Georgiou,G., and Iverson, B.L. *Nature Biotechnology.* 18, 1071-1074.
7. 2002 Cell Surface Display And Cytometric Screening for Protein Ligand Isolation and Engineering, In: Vector Targeting for Therapeutic Gene Delivery. Daugherty, P.S. *Wiley Press*
8. 2003 Construction of Designed Combinatorial Libraries Using Gene Assembly Mutagenesis, Bessette, P.H., Nguyen, A.W., Mena, M. A., Daugherty, P.S. *Meth. Mol. Biol.* Humana Press V. 231, 29-38.
9. 2003 Production of Randomly Mutated Plasmid Libraries Using Mutator Strains, Nguyen, A. W., Daugherty, P.S. *Meth. Mol. Biol.* Humana Press V. 231, 39-43.
10. 2004 Flow Cytometric Cloning of Fluorescent Proteins from cDNA Expression Libraries, Bessette, P.H., Daugherty, P.S. *Biotechnology Progress* 20, 963-967.

11. 2004 Rapid Isolation of High Affinity Protein Binding Peptides Using Bacterial Display, Bessette, P.H., Rice, J. Daugherty, P.S. *PEDS*, 17(10):731-9.
12. 2005 Evolutionary Optimization of Fluorescent Proteins for Intracellular FRET, Nguyen, A.W. Daugherty, P.S. *Nature Biotechnology*, 23(3):355-60.
13. 2005 Computational Design of Degenerate Codon Libraries, Mena, M.A., Daugherty P.S. *PEDS*, 18(12):559-561.
14. 2005 Marker Specific Sorting of Rare Cell Using Dielectrophoresis, Hu, X. Bessette, P.H., Qian, J. Meinhart, C.D., Daugherty, P.S., Soh, H.T. *PNAS*, 102(44) 15757-15761.
15. 2005 Isolation of Cell Specific Peptide Ligands from Fluorescent Bacterial Display Libraries, Dane, K.Y., Chan, L., Rice, J.R., Daugherty, P.S. *J. Immunological Methods*, In Press
16. 2005 Enzymatic Synthesis of Layered Titanium Phosphates at Low Temperature and Neutral pH by Cell-Surface Display of Silicatein- α , Curnow, P., Bessette, P.H., Kisalilus, D., Murr, M.M., Daugherty, P.S., Morse, D.E. *JACS*, 127(45):15749-15755.
17. 2005 Fluorescent Protein FRET Applications: Protein Engineering, Intracellular Sensing, and Interaction Screening, Nguyen, A.W., You, X. Jabaiah, A.M., Daugherty, P.S.” *Principles of Fluorescence Spectroscopy, Fluorescent Proteins and their uses*. Vol. 12; In Press.
18. 2005 Bacterial Display Using Circularly Permuted Outer Membrane Protein X Yields High Affinity Peptide Ligands, Rice, J.J., Schohn, A., Bessette, P.H., Boulware, K.T., Daugherty, P.S. *Protein Science* In Press

Courses Taught

ChE 171 Introduction to Biochemical Engineering
 BMSE 241 Introduction to Biopharmaceutical Engineering
 ChE 180 Undergraduate Chemical Engineering Laboratory

Selected Invited Presentations

1. Rapid Molecular Recognition Element Isolation Using Bacterial Display Peptide Libraries; UCSB MROP Presentation, January 2002
2. Evolution of the Efficiency of RET in Fluorescent Proteins, UCSB, Physical Chemistry Seminar, 2003.
3. Accelerating Affinity Reagent Development, BD Biosciences, San Jose, CA, April, 2004.
4. Molecular Recognition in High Gear: Bacterial Display, Genencor International, San Francisco, CA, 2004.
5. New Strategies for Therapeutic Protein Engineering, Neuroscience Research Institute, UCSB
6. The FACS on Molecular Recognition: Bacterial Display Peptide Libraries, Lawrence Livermore National Labs, Bio-Security Group, April, 2004.
7. Biotechnology Tools for Discovery and Synthesis, Army Research Labs, Natick Soldier Center, & USAMRIID, Ft. Detrick, 2004.
8. The FACS on Bacterial Display: Engineering Molecular Recognition, Bioprocess Technology Institute, University of Minnesota, Mpls, MN, September, 2004.
9. The FACS on Biomolecular Recognition: Bacterial Display Peptide Libraries, USAMRIID, Fort Detrick, MD, 2004.
10. Accelerating affinity reagent development using Bacterial Display Peptide Libraries, Applied BioSystems, Santa Clara, CA, October, 2004.
11. Bacterial Display Process Development for Peptide Affinity Reagent Production, American Society for Microbiology, San Diego, CA, Nov, 2004.
12. Display Library Screening-on-a-Chip, Phage Display Meeting, Cambridge, MA, May 2005.
13. New Proteomics Tools for Systems Biology, FOSBE Meeting, Santa Barbara, CA, August, 2005.
14. Exploiting Molecular Specificity for Biopharmaceutical Development, Johns Hopkins University, November, 2005.
15. Exploiting Molecular Specificity for Biopharmaceutical Development, University of Texas at Austin, November, 2005.

Selected Contributed Presentations

1. Bacterial Display Peptide Libraries, ECI Biochemical Engineering Meeting, Boulder, CO, July 2003.
2. Rapid Isolation of High Affinity Protein-Binding Peptides Using Bacterial Display, ACS National Meeting, Anaheim, CA. March, 2004.
3. Bacterial Display Peptide Libraries From Targets to Affinity Reagents in 24 Hours, World Congress on Biotechnology, Santiago, Chile, Oct, 2004.
4. Accelerating Affinity Reagent Development with Bacterial Display Peptide Libraries, AIChE National Meeting, Austin, TX, November, 2004.
5. Protease Isolation and Evolution in the Intracellular Environment, ACS National Meeting, San Diego, CA, March, 2005.