

CPAC RESEARCH PROJECTS

for Year 25: 10/1/08–9/30/09

Chemometrics:

- **Novel Tools Combining Data Mining and Statistical Inferencing Techniques:** Steven D. Brown, Department of Chemistry and Biochemistry, U. of Delaware
- **New Approaches to Updating and Transfer of Multivariate Calibrations:** Steven D. Brown, Department of Chemistry and Biochemistry, U. of Delaware

Sensors:

- **Adaptive Optics to Visualize and Quantitate Dynamic Processes:** Lloyd Burgess, CPAC, with Rob Synovec, Chemistry, UW
- **An Automated Surface Plasmon Resonance (SPR)-Based Biosensor System for Near Real-Time Process Analysis: Protein Production in an *E. coli* Bioreactor System:** Clement E. Furlong, Medical Genetics, UW
- **Vapochromic Detection and Identification of Important Analytes:** Kent Mann, Department of Chemistry, U. of Minnesota, Brian J. Marquardt, APL, with Bart Kahr, Chemistry, UW
- **Modular Sensing Architectures for Low-Cost Wireless Monitoring of Chemical Processes:** Brian Otis and Babak Parviz, Electrical Engineering, UW

Spectroscopy/Imaging:

- **Dielectric Scanners for Depth Profile Measurements:** Alexander Mamishev, Electrical Engineering, UW
- **Evaluating Raman Spectroscopy to Improve Process Monitoring and Materials Characterization:** Brian J. Marquardt, Applied Physics Lab (APL), with Renata Bura and Rick Gustafson, Forest Resources, and Ray Chrisman, Visiting Scholar, Forest Resources, UW
- **NEW Investigating the Use of LIBS as an Effective Process Analysis Tool:** Brian J. Marquardt, Applied Physics Lab (APL), UW
- **NEW Improving the Sensitivity of Nuclear Magnetic Resonance for Process Analysis:** Michael J. McCarthy, Sandra Garcia, and J.H.

Walton, University of California, Davis, and Scott Collins, University of Maine with Professor Songi Han, University of California, Santa Barbara

- **Magnetic Resonance-Based Sensor System for In-Line Analysis:** Michael J. McCarthy, UC Davis

Chromatography:

- **Process Gas Chromatography and Chemometrics:** Robert E. Synovec, Department of Chemistry, with Brian Rohrback, InfoMetrix, Inc.
- **Process Liquid Chromatography: Adaptation of an Integrated Microfluidic Chromatography and Sample Pretreatment Sensor to NeSSI™-type Sampling Systems:** Robert E. Synovec, Department of Chemistry, UW with Lloyd W. Burgess, Chemistry, Scott Gilbert, Visiting Scholar, Chemical Engineering, UW

Process Optimization and Control:

- **Fermentation Monitoring Initiative (FermI):** Clement Furlong, Medical Genetics, and Brian Marquardt, Applied Physics Lab (APL)
- **Analytical Applications of New Sampling/Sensor Initiative (NeSSI™):** Brian J. Marquardt, APL, UW
- **New Sampling/Sensor Initiative (NeSSI™) and Microreactors:** Brian J. Marquardt, APL, with Daniel Schwartz, Chemical Engineering, and Rick Gustafson, Forest Resources, UW

Bio-Energy

- **NEW Evaluation of Prospective Lignocellulosic Biomass for Bioethanol Production: Development of a High Throughput Screening System:** Renata Bura and Rick Gustafson, Forest Resources, and Brian Marquardt, Applied Physics Lab (APL), UW
- **NEW Super Critical Water Gasification of Biomass:** Joyce Cooper, Mechanical Engineering, UW
- **NEW Instrument and Method to Characterize Steam Explosion Pre-Treated Biomass:** Rick Gustafson and Renata Bura, Forest Resources, UW
- **Application of Novel Membranes for Separation and Concentration in Lignocellulosic Biorefineries:** Rick Gustafson and Renata Bura, Forest Resources, Brian Marquardt, Applied Physics Laboratory (APL), UW and Ray Chrisman, Atodyne

Bio-Analytical

- **NEW A New Method for High-Throughput Sample Discretization:**
Daniel T. Chiu, Chemistry, UW
- **NEW Development of a High-Throughput Protein Analysis System:** Norman J. Dovichi, Chemistry, UW