

CPAC Summer Institute

July 22-24, 2014

The theme will build again on the growing interest in ‘molecule management’, a key step in process characterization which leads to process optimization – and the final goal of process control. Building on the successful impact of results from better characterization of incoming raw material at oil refineries, multiple industries could improve their operations by improving their process and material characterization.

The effective use of measurement science to gather data leading to characterization is important. The general concept of gathering the data using simpler analyzers to replace the very expensive instruments is of broad interest since many groups cannot afford the cost of a major instrument on a process and for raw material identification.

In terms of handling the data generated by analyzers, the general concept of data fusion to more completely characterize a material is very powerful. It is particularly valuable when it is understood that it can provide better data faster and more accurately than many physical tests. It is valuable to have early involvement of control engineers since this data enables the use of feed forward control and the generation of predictive estimation tools.

Discussion topics will include:

- How can we achieve a better understanding of the data fusing process? For example, has the problem of fusing multivariate and uni-variate data been solved?
- Almost by definition, multiple instruments will go out of calibration at different rates and this will be a problem that must be understood and solved.
- It is important to understand what types of data can be modeled and also if we go to simpler instruments what are the requirements for making the change.

The three day schedule ends on Thursday evening with a BBQ dinner off-site event. The final afternoon will summarize the technical areas and meld the conclusions into a broader look at the future impact of Process Analytical Technology (PAT) for Process Optimization.

CPAC has an established track record in fostering academic/industrial/national laboratory interactions, which aims at bridging the gap between basic research and full-scale process/product development. CPAC's Summer Institute (SI) will provide continuing education opportunities in the areas of advances in measurement science linked to process control.

The CPAC Summer Institutes are held in an informal format, with technical presentations, and time allotted for open discussion and brainstorming on topics that arise from this interaction. The informal environment has created a successful format for bringing together chemists, biologists, measurement scientists, and process engineers from industry, government, and academic

institutions drawn from both CPAC and non-CPAC members. The program will be structured to include plenary talks on broad topics, such as challenges and needs. There will be talks that present advances in technologies that enable one to address these needs. These will include areas like sensors, fluidics, sampling, and control. Advances in continuous process unit operations such as reactions, separations and purification will also be presented and discussed.

CPAC Summer Institute 2014 - Agenda

Process Characterization leading to Process Optimization

Tuesday, July 22, 2014 - UW Club

8:30	Meeting Registration Desk Opens – University of Washington Club, UW
9:00-9:05	Meeting Welcome Brian Marquardt, CPAC Director, Applied Physics Laboratory, UW
9:05-9:15	Introduction to the Summer Institute Theme Mel Koch, CPAC,APL, UW
9:15- 9:50	Molecule Management in Energy Supply Kurt VandenBussche, UOP Honeywell
9:50-10:20	Harnessing New Technologies to Speed Process Development and Optimization to Enable the Use of New Processing Concepts. Ray Chrisman and Jim Schreck, consultants to the Iowa Corn Board
10:20-10:35	Break
10:35-11:15	Developing a QC System to Handle Data from Multiple Sources and Multiple Unit Operations. Brian Rohrback, Infometrix, Inc.
11:15-11:45	A Universal Solution to Homogeneous and Heterogeneous Sampling. Graham Marshall, Global FIA
11:45-12:10	Introduction of Meeting Participants and Discussion
12:10-1:15	Lunch

1:15-1:30	Update on CPAC Activities Mel Koch, CPAC, UW
1:30-2:10	Reassessing the Capabilities Inferential Spectroscopy Marcus Trygstad, Yokogawa
2:10-2:40	Overview of UW eScience Institute and an Update on a Project in Molecular Monitoring David Beck, UW Chemical Engineering and UW eScience Institute
2:40-2:55	Break
2:55-3:20	Improving GC - TOFMS Data Interpretation using Two Dimensional Mass Cluster Plots Rob Synovec and Brian Fitz , UW Chemistry,
3:20-3:45	Advances in Supervised Analysis of GCxGC - TOFMS Data using Tile-Based Fisher Ratio Software. Rob Synovec and Brrendon Parsons, UW Chemistry
3:45-4:30	Visual Analytics of Data to Improve Communication of Project Results Dustin Smith, Tableau
4:30-5:30	Discussion
6:00	Dinner at Ivars Salmon House

Wednesday, July 23, 2014 - UW Club

8:30-9:00	Registration
9:00-9:10	Daily Overview Mel Koch, CPAC, Applied Physics Laboratory (APL) UW
9:10-9:40	Development of an Analytical Sampling System for Real-Time Monitoring of Continuous Flow Reactors Brian Marquardt and Mark Weller, CPAC, Applied Physics Laboratory (APL), UW
9:40-10:10	Advances in the Development and Application of Vapochromic Sensors

	Brian Marquardt and Charles Branham, Applied Physics Lab, CPAC, UW
10:10-10:30	Break
10:30-11:05	Spectral TuneUp for Improved Motor Fuel Analysis Marcus Trygstad, Yokogawa
11:05-11:40	Advances in the Use of PAT for achieving Data Fusion that leads to Developments in Process Control Brian Marquardt and Tom Dearing Applied Physics Lab, UW
11:40-12:00	Discussion
12:00-1:15	Lunch
1:15-1:45	Approaches to Handling Data Generated by Pyrolysis Chemistry - Molecules Paul Dauenhauer, U Massachusetts / U Minnesota Chemical Engineering
1:45-2:15	Approaches to Handling data Generated by Pyrolysis Chemistry - Particles Jim Pfaendtner, UW Chemical Engineering
2:15-2:45	Battery-Free RF Energy Harvesting Gas Sensing Platform Josh Smith, UW Electrical Engineering and Computer Sciences
2:45-3:00	Break
3:30-4:00	Detection of Imperfection in Aircraft and Related Composite Parts Alexander Mamishev and Anna Makhotok, UW Electrical Engineering
4:00-4:30	Non Destructive Evaluation of Multilayer Films with a Fast, Portable, and Low Cost Terahertz Spectrometer Hassan Arbab and Dale Winebrenner, Applied Physics Lab UW

Thursday, July 24, 2014 - Lake Kachess Clubhouse

10:15-10:45	Design of Portable Surface Plasmon Resonance (SPR) Based Assays for Small and Large Analytes Clement Furlong, Graeme Carvlint, Jeremiah Lum, and Scott Soelberg. Medical Genetics & Genome Sciences, UW Medicine
10:45-11:15	New Developments with Micro- Sensors Joe Stetter, KWJ Engineering
11:15-11:45	Water Analysis Instrument Concepts for Solar Explorations J P. Kirby, Planetary Science Institute
11:45-12:30	Lunch
12:30-1:00	Multi-Variate Image Analysis on MRI to Predict Product Quality Michael McCarthy and Lu Zhang, Food Sciences, University of California at Davis
1:00-1:30	Investigation of the Use of Laser Induced Breakdown Spectroscopy (LIBS) as an Effective Process Analysis Tool Brian Marquardt and Sergey Mozharov, Applied Physics Lab UW
1:30-2:00	The Evaluation of a Cost Effective Method for Real Time Determination of Advanced Biorefinery Processes Elliott Schmitt and Renata Bura, UW Forest Resources
2:00-2:30	Low Power Circuit Design to Enable Miniature Wireless Sensors Brian Otis and Kannan Sankaragomathi. UW Electrical Engineering
2:30-3:30	Final Discussion, Summary, and Development of Action Plans
3:30-4:00	Reception at Nearby Cabin
5:00	BBQ Dinner at Cabin