CPAC Summer Institute 2020 Themes

Next generation processing approaches to enable maximum efficiency in the production of pharmaceutics, chemicals, and biomaterials and

Expanding process understanding based on the use of sensors and data handling – Enabling more efficient personalized medicine and complex process optimization of bio-based processes and petrochemical operations

A key enabler of the move to a Circular Economy will be process intensification that offers sustainable processing of lower volume distributed waste streams to generate a broad range of new platform chemicals including a growing list of biomass derived molecules. Bio-based projects are a large part of the path to a Circular Economy.

The 2020 CPAC Summer Institute will build on this first theme of sustainable process development and production. In addition, there will be an emphasis on exploring new reaction routes that benefit from the growing use of continuous flow technology and effective monitoring concepts.

The evolution of flow microscale reaction technology has led to a wide range of process intensification developments, often using novel operating windows for one-pot and cascade reactions, in the various steps that result in the ability to rapidly evaluate and optimize new reaction routes as well as offering more cost-effective processing. The key next step is the integration of these unit operations into end-to-end optimized continuous processes.

Next generation continuous manufacturing concepts will enable efficient end to end bio-processing for the implementation of a sustainable circular economy; based on the data from process analytical technology, PAT, required for rapid characterization of organism growth as well as production including product separation and purification.

The second theme will be to describe powerful new applications of continuous sensing and control using a unique new example from the medical treatment field. The Importance of Multiple Sensors in Evaluating Personalized Medicine is based on a review article and presentation prepared by Babatunde A. Ogunnaike, University of Delaware, USA. It was then modified by Ray Chrisman, MK Optimization and Control LLC, USA, to include an expanded section on how the use of smart sensing as developed for process operations can provide significantly more information to process models by using the pattern of data from groups of simple sensors. The approach is not unlike that used in petrochemical manufacturing operations.

This is particularly important where current treatment information comes from infrequent invasive sensing. Each individual is different and that extensive real time data that can be fused for more reliable
information would provide better information about how an individual is reacting to a medical condition and then in real time track the response to treatment.

An example of a blood disease demonstrated that not only is real time response data needed but also multivariate process models are needed to characterize how a patient is responding such that an optimized treatment becomes possible long before more serious complications can develop. The data showed that multiple life processes must remain in balance for effective control and that without good data to moderate drug impacts it is impossible to have an effective treatment program at least for this blood disease.

Of importance to both themes are:

- Recent advances in PAT for the real time characterization of raw materials, process streams, and complex biomass streams - for process understanding. This data can be used for rapid process development and for feed forward and feedback control to enable high-quality, cost effective processing.

- Utilization of new approaches in data handling including the use of big data — for end-to-end understanding and value extraction from chemical and biomass processing.

- Recognize the importance of solution providers – those companies and academic research groups that have developed measurement approaches, data handling approaches, and engineering concepts for process control

The event will be two morning Zoom meetings (July 21 and 22). We anticipate having short (15 minute) presentations and adequate time to discuss the presentations and how they relate to the themes.

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 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.

Registration fees for the 2020 Summer Institute are $50.00 US dollars. The fee covers the costs of setting up and running the event. Please complete the registration form on the following site:


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