M8a, Continuous Cell-Culture Technology

**(Mark-Henry Kamga, Ph.D. Candidate, UMass Lowell)**

The enormous potential of continuous bioprocessing is hindered by the bottlenecks of downstream processing, which, albeit some isolated success, continues to be executed in batch mode. Highlighting the critical drawbacks of batch chromatography, this module underscores the abrupt transition the industry has made by implementing continuous upstream process without devising a working model for downstream operations. This module emphasizes the first principle models of chromatography on which these initiatives are built. Various effective models of continuous chromatography, which are essentially multi-column systems, employed to congeal a unified process will be reviewed. Advancements made by several mechanistic models and simulations to maximize productivity and performance will be described, in an attempt to provide the integral tools needed to develop a strong model based control strategy, embedded in to the multi column framework. This module also addresses uncertainties of continuous chromatography.



Mark-Henry Kamga is currently a doctoral candidate at the Department of Chemical Engineering in the University of Massachusetts Lowell. He received his B.S. in Chemistry and Materials Sciences from the University of Buea, an M.S. in Organic Chemistry from East Tennessee State University and an M.S.E. in Chemical Engineering from the University of Massachusetts Lowell. He has 2 peer-reviewed publications on modeling of chromatography and multi-wave UV analysis. He has worked in the past for IBM, Procter & Gamble, Instrumentation Labs, Biogen and Biovolutions. He has over 5 years experience in batch, fed-batch, continuous cell culture and integrated continuous biomanufacturing.

M8b, Continuous DSP Development and Modeling

**(Ketki Behere, PhD Candidate, UMass Lowell)**

This module focuses on integrated continuous biomanufacturing platform for continuous production of therapeutic proteins in bioreactors at fixed volumes and cell concentrations for extended periods (30 – 90 days). The integrated platform offers a unique opportunity for developing a rapidly adaptable platform for antibody production in the rapidly evolving biotechnology environment with growing importance of biosimilars, increased market demands and regulation, emerging economies, renewed interests in orphan drugs and increased focus on single use systems. This module provides various continuous upstream technology of antibody production.



Ketki Behere is currently a PhD candidate at the University of Massachusetts Lowell. Her research focusses on characterization of Protein A resin in downstream chromatography. This research probes into Protein A resin lifetime study to improve the process efficiency in both batch and multi-column chromatography. She is studying the mechanism of action of caustic (NaOH) on the Protein A leaching. This study involves modeling, simulation and targeted DOE study of different Protein A resins. She has worked in Lonza Biologics, Portsmouth as a Co-op student in the Manufacturing Sciences and Technology (MSAT) group and as a Research Associate at Lonza Biologics, Hopkinton in the Downstream Process Development (PD) group. She has worked as Production executive in Manufacturing of biosimilars at Reliance Life Sciences (RIL) in India. She has a Bachelor of Engineering degree in Biotechnology Engineering from Shivaji University in India.