CBST Seminar

Center for Biomanufacturing Science & Technology

University of Delaware

DATE:
April 6, 2016
TIME:
2:00 p.m.
LOCATION:
366 Colburn Lab

Dr. Steven Cramer

Professor, Chemical and Biological Engineering

Rensselaer Polytechnic Institute

Steven Cramer is the William Weightman Walker Professor of Chemical and Biological Engineering. He is currently conducting research on several areas related to protein-surface interactions including: prediction of protein binding affinity and multiscale modeling of chromatographic systems, development of efficient antibody separation systems, fundamental studies in multimodal chromatography, novel chromatographic and diode based electrophoretic lab on chip systems, chemometrics for process analytical technology, multilevel automated peptide synthesis/ screening system for design of affinity peptides, smart biopolymer affinity precipitation systems, hierarchical bioprocessing, biophysics of protein interactions with surfaces, ligands and proteins, platformable strategies for effective removal of process HCPs, and integrated semi-continuous biomanufacturing processes. Professor Cramer was the awarded the Alan S. Michaels Award for the Recovery of Biological Products (ACS Division of Biochemical Technology) and the ACS National Award in Separation Science and Technology. He was also awarded Rensselaer's School of Engineering Outstanding Professor Award and the Research Excellence Award. Dr. Cramer was given a Presidential Young Investigator award from the National Science Foundation, the Early Career Award from Rensselaer Polytechnic Institute as well as several teaching awards. Professor Cramer has been elected a fellow of the AIChE, the ACS and the American Institute for Medical and Biological Engineering. He has chaired several prestigious meetings including 2 International HIC/RPC Bioseparation Conferences, 2 ACS Recovery of Biological Products Meetings and the Gordon Conference on Reactive Polymers. Prof. Cramer has published over 176 papers in peer-reviewed journals and has 10 patents. Importantly, he has produced 41 Ph.D. students who have gone on to leadership positions in the biotechnology industry and academia.

"Understanding and Enhancing Selectivity in Multimodal Chromatography"

This research seeks to determine what conditions are required to achieve selective separations of similar protein variants and to provide fundamental insight into the mechanisms underlying these separations. The retention of protein libraries on several multimodal cation-exchange systems demonstrated that the retention of many proteins proved to be sensitive to subtle changes in the ligand chemistry and geometrical presentation. All-atom explicit Molecular Dynamics (MD) simulations were then carried out to shed light on the multiple weak interactions that resulted in the unique selectivities achieved in these multimodal chromatographic systems. A range of biophysics techniques was also employed to study the energetics, kinetics and thermodynamics of protein binding to self-assembled monolayers (SAMs) of MM ligands. This work provides fundamental understanding of the nature of these interactions at the molecular level and insight into the design of MM ligands with important implications for addressing challenging problems in downstream bioprocessing.