CBST Seminar

Center for Biomanufacturing Science & Technology

UNIVERSITY OF DELAWARE

Dr. Caryn Heldt

Professor, Department of Chemical Engineering

Michigan Technological University

DATE:
Dec. 1, 2016
TIME:
1:30 p.m.
LOCATION:
366 Colburn Lab

Dr. Caryn L. Heldt is the James and Lorna Mack Chair in Bio-engineering, an Associate Professor in the Department of Chemical Engineering, and an Adjust Associate Professor in Biological Sciences at Michigan Technological University. She received her B.S. in Chemistry and Chemical Engineering from Michigan Technological University in 2001. She worked for two years at BASF Corporation before commencing her Ph.D. studies. Upon receiving her Ph.D. in Chemical Engineering from North Carolina State University in 2008 under the guidance of Dr. Ruben Carbonell, she joined Rensselaer Polytechnic Institute for her 2-yr postdoctoral training under the guidance of Dr. Georges Belfort.

In 2010, Dr. Heldt began as an Assistant Professor at Michigan Technological University and was promoted to Associate Professor in 2015. In 2015, Dr. Heldt was awarded an NSF CAREER award to study virus surface chemistry. She is currently on sabbatical as a Visiting Scientist with Pfizer. Her lab is focused on the purification, removal, inactivation and detection of viruses and other pathogens.

"Virus Purification Based on Surface Properties"

In this age of modern medicine, viral diseases continue to take the lives of millions of people. The most effective method to prevent viral infections is vaccines. However, there needs to be an improvement in the current manufacturing process of viral products to efficiently produce new viral vaccines and other viral products. In our pursuit to improve the purification process, we began by studying an important surface property of viruses, surface hydrophobicity. Once we determined that our model virus, porcine parvovirus (PPV), was highly hydrophobic, we then examined methods to purify the virus using this principle. This talk will focus on two methods, virus flocculation in the presence of osmolytes and aqueous two-phase extraction (ATPS). Both are alternatives to chromatography and ultra/nanofiltration. ATPS works by partitioning the hydrophobic virus to the PEG-rich phase, while the more hydrophilic contaminating proteins stay in the salt-rich phase. ATPS works well on our model virus, with a 64% recovery. However, the osmolyte flocculation works well for both the non-enveloped PPV and also the enveloped Sindbis virus. The flocculation occurs because the hydrophobic viruses are more susceptible to the removal of water by high concentrations of osmolytes, as compared to the hydrophilic proteins. We have achieved a recovery of 55% infectious PPV with diafiltration, while removing >80% of the host cell proteins in one purification step. In the future, we will determine if osmolyte flocculation has the potential to become a platform approach to virus purification. This would greatly reduce the cost of viral product manufacturing and expand the ability of low-income countries to obtain needed vaccines.