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Hosted by A/P Ganesh Anand

Interaction of Viral Capsids for Inactivation and Removal



By Caryn L. Heldt

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Novel genetic and molecular tools have revolutionized the study of viral capsid interactions. These tools have allowed us a better understanding of the viral life cycle and the creation of antiviral drugs that are pathogen specific. However, there is a need to find more general attributes of viral surfaces that permit the inactivation and removal of viruses on a large scale for general use in water purification, biotherapeutic production and general hospital disinfection. The general surface property that is typically used for these applications is charge. It is well known that cationic surfaces attract viral particles. In our work, we have been applied a lesser known surface property of viruses, hydrophobicity. We studied the surface of our model virus, porcine parvovirus (PPV), using experimental and computational techniques and found it to be highly hydrophobic as compared to a range of proteins. This study of hydrophobicity led us to a unique method of virus removal using naturally occurring osmolytes. Osmolytes, like amino acids and sugars, are well known to control water structure around proteins. For this reason, they are often used to stabilize protein formulations in the biotechnology industry. Our use of osmolytes is to remove viruses through preferential flocculation. In the process of studying virus interactions with osmolytes, we also discovered unique antiviral compounds that greatly reduce infectivity of viruses post-infection. This talk will explore our studies of viral surfaces and their application in virus removal and infectivity reduction.

About the Speaker

Dr. Caryn L. Heldt is an Associate Professor in the Department of Chemical Engineering 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-year 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. Her lab is focused on the purification, removal, inactivation and detection of viruses and other pathogens.

Artwork by Ann Nee, DBS, NUS