Chemical and Biomolecular Engineering

Spring 2021 Seminar

Professor Peter Tessier

Department of Chemical Engineering

University of Michigan Ann Arbor

Date: Thursday, April 8, 2021

Time: 10:30 a.m.

Zoom Meeting ID: 923 4118 2279 Passcode: 102035

Toward Optimal Antibody Engineering Using Machine Learning

Abstract: The use of monoclonal antibodies as therapeutics is now pervasive throughout the biotechnology industry. The large number of therapeutic antibodies in development and in the clinic is leading to unprecedented opportunities to generate predictive methods for identifying antibodies with drug-like biological and physicochemical properties. We have developed machine learning models for identifying antibodies with optimal combinations of affinity and various biophysical properties. Our approach combines novel descriptors of antibody molecular features with neural networks to identify Pareto optimal antibody variants with different levels of affinity improvement while minimizing natural trade-offs involving other key properties (e.g., specificity). These methods greatly reduce the required experimentation needed during antibody engineering efforts for co-optimizing multiple antibody properties, and hold great potential for improving the rapid generation of safe and effective antibody therapeutics.

Bio: Professor Peter Tessier is the Albert M. Mattocks (Endowed) Professor in the Departments of Chemical Engineering, Pharmaceutical Sciences and Biomedical Engineering, and a member of the Biointerfaces Institute at the University of Michigan in Ann Arbor, MI. He received his Ph.D. in Chemical Engineering from the University of Delaware (2003, NASA Graduate Fellow) and performed his postdoctoral studies at the Whitehead Institute for Biomedical Research at MIT (2003-2007, American Cancer Society Fellow). Professor Tessier started his independent career as an assistant professor in the Department of Chemical & Biological Engineering at Rensselaer Polytechnic Institute in 2007, and he was an endowed full professor at Rensselaer prior to moving to the University of Michigan in 2017. His research focuses on designing, optimizing, characterizing and formulating a class of large therapeutic proteins (antibodies) that hold great potential for detecting and treating human disorders ranging from cancer to neurodegenerative diseases. He has received a number of awards and fellowships in recognition of his pioneering work: Pew Scholar Award in Biomedical Sciences (2010-2014), Humboldt Fellowship for Experienced Researchers (2014-2015), Young Scientist Award from the World Economic Forum (2014), Young Investigator Award from the American Chemical Society (2015) and NSF CAREER Award (2010-2015).