Chemical Engineering

Spring 2022 Seminar Series

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Designing Computational Tools and High-Throughput Experimental Strategies for Purifying Biotherapeutics

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Thursday, February 17, 2022
4:15pm, 66-110
or via Livestream (link to be sent day of seminar)

ABSTRACT: Biomanufacturing is a multi-billion-dollar industry responsible for reliably producing life-saving medicines such as recombinant proteins, vaccines, and cell therapies to meet growing patient needs. Historically, the diversity among these therapies has been largely limited to monoclonal antibodies and the industry has created hard-coded infrastructures and platforms to support this molecular class. The recent growth in new therapeutic formats along with the need to rapidly manufacture these medicines at unprecedented scales in the era of COVID, however, has created a call for modernization in bioprocessing. In particular, downstream purification is a major bottleneck in this space and there is a need to develop platformable strategies to purify therapeutics not amenable to traditional platform frameworks. In this seminar, I will describe the development and implementation of a set of experimental and computational tools and strategies that we created to improve the speed and efficiency in rational design of biotherapeutic purification processes. We will also explore the complex adsorptive properties of new mixed-mode chromatography resins and describe our mathematical frameworks for understanding and quantifying their behaviors for efficient incorporation into downstream processes for a wide range of protein therapeutics. Finally, we will discuss strategies and opportunities for designing the next generation of sorptive separation materials functionalized with peptides and peptide-like chemical moieties optimized for purifying emerging therapeutic modalities.