UNIVERSITY OF DELAWARE

CHEMICAL & BIOMOLECULAR ENGINEERING

SPRING 2024 SEMINAR SERIES

EXPLORING NATURE'S BIOMOLECULAR CONSOLE BOARD: ENGINEERED LIGANDS FOR MODERNIZING THE PRODUCTION OF VIRAL, CELLULAR, AND REGENERATIVE THERAPIES

MAR 15 | 10:15 AM | 102 COLBURN LAB

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Attend virtually: https://udel.zoom.us/j/91386404306

Harvest time has come for modern biotechnology and biotherapeutics, bringing a cornucopia of products – gene-editing nucleases, therapeutic viruses and cells, and engineered tissue constructs – that are defining the medicine of the future. Along with superior therapeutic efficacy, these products feature unprecedented complexity of biomolecular features and range of scales that define their identity, efficacy, and safety. This complexity poses an arduous - yet exciting - challenge: how to produce and control these complex, and often labile, biologics at the volume, purity, and activity that matches the growing demands of clinics and biotech industries worldwide? Our approach seeks to leverage affinity triggers to re-envision the tools implemented in the construction, purification, and characterization of biological and biomedical products. Through the last decade, we integrated structured peptides and peptide-mimetics into materials with controlled morphological, optical, and mechanical properties to forge novel multi-modal substrates. In this talk, I will present some highlights of our technology portfolio: (1) Photo-affinity and smart adsorbents that interact with proteins and use light irradiation or biomolecular reconfiguration as adsorption controls, enabling the purification of labile therapeutics and gene-editing products; (2) Sismo-tropic (σεισμός τροπή, vibration-controlled) surfaces that leverage vibration-sensitive peptides and frequency/amplitude-defined perturbation to tailor in real time the dynamic range and sensitivity of sensor arrays to a multitude of analytes, and provide for sensing regeneration to extend their use in evolving systems; (3) chemo-tropic scaffolds where peptide ligands are used to build multimodal and reconfigurable gradients of surface density and display of growth factors that recapitulate the morphogenic patterns of the extracellular matrix.

ABOUT THE SPEAKER

Stefano (Stef) Menegatti is an associate professor in the department of Chemical and Biomolecular Engineering at NC State University. His team focuses on biorecognition phenomena and engineering of synthetic ligands for biological separations, biosensors, and regenerative medicine applications. Together with Mike Daniele at NC State University, Stef co-founded the North Carolina Viral Vector Initiative in Research and Learning (NC-VVIRAL, https://vviral.ncsu.edu/), a consortium of academic, industrial, and non-profit institutes members whose collective mission is to support biotech and biopharma industries with novel technologies and products in the gene-editing and gene-and-cell-therapy fields. Stef's collaborations with academia and industry span across 3 continents, and have resulted in the adoption of technologies utilized for producing plasma proteins, recombinant therapies, and viral vectors for gene therapy. In 2015, Stef co-founded LigaTrap, a company marketing affinity resins for biological separations, where he now serves as Chief Technology Officer. In his free time, he enjoys painting, playing music, and collecting antique books.

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