

MIT Chemical Engineering Department

Spring 2021 Seminar Series

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Engineering Immunology Using Chemistry and Data Science



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Abstract: Chemical and biological function depends on the interplay between the system and its surrounding where the outcome depends on the context of the problem, typically identified by its environment. How do you represent the context for system and surroundings at different scales ranging from atoms to cells? How do you develop molecules with specific properties ranging from controlling reactivity to developing immunomodulators as drug leads? How to teach computers to do this by combining physical modeling, principles of data science, autonomous measurements and instrumentation? How to target immune cell function in different environments using chemical biology and bioanalytical chemistry? I will give an overview of my research program in *Chemical and Cellular Immunology* with selected examples to address the above questions including descriptions of chemical tools and interpretable machine learning models with prospective experimental validation *in situ*, *in vitro* and *in vivo*.