

# CARNEGIE MELLON UNIVERSITY

## BME 2025 SPRING SEMINAR SERIES

### Engineering polymeric biomaterials across length scales



#### PRESENTED BY

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#### SCHEDULE

**Doherty Hall (DH) 2315**

**Thursday,  
February 6, 2025**

**(11:00-12:00 PM)**

Engineered biomaterials can enable new strategies to diagnose and treat diseases, by controlling drug pharmacokinetics or enabling new ways to query tissue state. To effectively do so, biomaterials must be able to interact with tissues of interest and dynamically respond to their environment. Polymeric biomaterials are well-suited to address these requirements due to their tailorability and programmability. In this talk, I will present how these materials may be engineered to control biodistribution after injection, and to undergo a programmed function in response to biological or synthetic cues. At the nanoscale, I will discuss how controlled radical polymerization enables discovery of new materials properties that drive renal accumulation for drug delivery applications, and how imparting acid- and protease-sensitivity can program drug release and disease sensor activation. At the macroscale, I will discuss how synthetic, biocompatible chemicals can be leveraged to control the complex gastric environment and induce intra-gastric formation of a tough, polymeric hydrogel, to enable oral delivery of sensitive protein and therapeutic bacteria in large porcine models. Throughout, I will highlight the design process of polymers across these various applications, and the challenges and opportunities of operating at each materials and animal model length scale.



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