

CARNEGIE MELLON UNIVERSITY

BME 2024 SPRING SEMINAR SERIES

A bioelectric interface to the collective intelligence of agential materials for bioengineering



PRESENTED BY

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SCHEDULE

Doherty Hall (DH) 2315

**Thursday,
February 22, 2024
(11:00-12:00PM)**

Engineering with traditional, passive matter involves micromanaging all of the components and functionality. Here I will discuss the conceptual and experimental shifts needed to harness living matter by exploiting its competencies as an agential material: a multiscale medium in which tissues, cells, and even the molecular networks within them have capabilities such as memory and problem-solving. Our lab studies the ways in which evolution has shaped the collective intelligence of cells, which offers a kind of top-down access to the software of life in all tissues. This is mediated, as in the brain, by bioelectric networks. I describe new techniques for reading and re-writing the pattern memories processed by endogenous bioelectric networks and briefly show examples of applications in vivo such as repair of birth defects, induction of regeneration of complex appendages, and normalization of cancer. I will especially emphasize on applications to synthetic morphology (biorobotics) and discuss a future roadmap for regenerative medicine and bioengineering that exploits approaches from the field of diverse intelligence applied to living materials.



**BIOMEDICAL
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