



HUMANITY CENTERED  
ROBOTICS INITIATIVE  
RHODE ISLAND



Humanity Centered Robotics Initiative Talk

**Ian Wong, Brown University**

Wednesday, October 2 at 2pm in CIT 477 Lubrano

**“Beyond 2D: Self-Organizing Patterns in Smart Materials and Discrete Agents”**



*Abstract:* Biologically-inspired materials can be engineered with dynamic, information-rich functionality to exhibit responsive and emergent behaviors. In this seminar, I will present recent results from my group to pattern and print soft materials, as well as to understand collective cell migration. First, we utilize mechanical deformations to wrinkle and crumple graphene oxide membranes into hierarchical architectures. We find that sequences of mechanical deformations generate unique structural features, suggestive of a mechanically encoded memory. These ultrastretchable coatings exhibit outstanding chemical resistance and may be utilized for smart fabrics and soft devices. Second, we utilize light-directed 3D printing to ionically crosslink alginate and other polyelectrolytes into hydrogels. We demonstrate a set of modular building blocks for DIY soft machines and microfluidics. Finally, we show that migratory cancer cells exhibit agent-like behaviors and mimic the aggregation of non-living, thermally driven particles. Overall, these active and smart materials mimic the complex biological functionalities observed in living system.

**Ian Wong** engineers new miniaturized technologies based on BioMEMS and microfluidics to investigate cancer cell invasion, drug resistance, and heterogeneity. He is also interested in the unconventional fabrication of bio and nano materials using self-assembly and 3D printing. He received his A.B. magna cum laude in Applied Mathematics from Harvard University in 2003. He did his graduate work on the directed self-assembly of biomolecular materials with Nick Melosh, receiving a Ph.D. in Materials Science and Engineering from Stanford University in 2010. His postdoctoral training was with Mehmet Toner and Daniel Irimia at the Center for Engineering in Medicine at Massachusetts General Hospital from 2010-2013. He joined Brown University as assistant professor of engineering in July 2013. He has been recognized with an NSF Graduate Research Fellowship, a Damon Runyon Cancer Research Fellowship, the Brown University Pierpont Award for Outstanding Advising, as a 2017 Biomaterials Science Emerging Investigator, and a 2017 Lab on a Chip Emerging Investigator.

Host: Michael Littman/HCRI

For more information on this talk and the HCRI Speaker Series, contact [hcric@brown.edu](mailto:hcric@brown.edu) or visit [hcric.brown.edu](http://hcric.brown.edu).