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Nanoscale Biomaterials for Rational Combination Therapies against Metastatic Solid Tumors

Tuesday, March 3
458 Richards Hall
11:15am – 12:30pm

Refreshments will be served

ABSTRACT Drugging solid tumors with combinations of nucleic acids and small molecules can be challenging when cellular colocalization is required for efficient tumor cell killing. Self-assembled polymers represent a powerful tool that can tailor the delivery of drug combinations to tumor cells in a manner that maximizes synergistic or synthetic lethal interactions while minimizing off-target effects. Here, we describe recent progress in our laboratory on the engineering and development of modular nanoscale biomaterials based on (i) layer-by-layer (LbL) self-assembly, (ii) synthetic lipid-like peptide amphiphiles, and (iii) bottle-brush polymer nanoparticles and their application in diagnostic and therapeutic interventions that target heterogeneous tumors, sensitize cancer cells to frontline chemotherapy, image tissues with improved safety and contrast, and silence pro-survival proteins in tumor metastases. This work emphasizes how engineered biomaterials can exploit new insights into cancer cell signaling to address unmet needs in current clinical interventions for breast, lung, and ovarian cancer.

BIOGRAPHY Erik is a native of Atlanta, GA and received his PhD from Georgia Tech in 2012. There, he worked with Mostafa El-Sayed to develop tumor-targeted imaging agents and therapeutics that exploit the unique structural, optical, and chemical properties of nanoscale gold particles. He is currently Ruth L Kirschstein postdoctoral Fellow in the Department of Chemical Engineering at MIT, where he works with Paula Hammond at the Koch Institute for Integrative Cancer Research. His future research interests include nanoscale biomaterials, wearable biosensors, and immune engineering. When he's not shoveling snow in Boston, he enjoys running and guitar.