

BME SEMINAR SERIES FALL 2021

BME Rising Star Santiago Correa, PhD

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Stanford University
Host: Guillermo Ameer

Monday, December 13, 2021
4:00 – 5:00 pm
Tech L361

“SELF-ASSEMBLED NANOTECHNOLOGIES FOR PRECISION BIOMATERIALS”

Self-assembled materials with defined nanoscale architectures can engage with biological systems in fundamentally new ways, providing unprecedented biomedical opportunities. In particular, the ability to more precisely control both the location and timing of drug release makes these biomaterials especially useful for delivering potent or sensitive cargo, which has major implications for immuno- and tissue engineering. Whether it is drug delivery, gene therapy, or regeneration, these materials are pushing the boundaries for engineering our own biology.



In this seminar, I will discuss how self-assembled biomaterials are used to manipulate the tumor microenvironment to achieve gene silencing, non-invasive tumor detection, and localized immunostimulation in vivo. By leveraging non-covalent interactions to build composite nanomaterials, we constructed multi-functional biomaterials capable of dynamic stimuli-responsive behaviors. I will detail the development of nanoparticle coatings that target ovarian tumors and preferentially traffic to specific subcellular compartments. These coatings enabled the development of both theranostic and immunostimulatory nanomedicines that required specific subcellular trafficking to carry out their functions. I will also discuss the development of nanoparticle-based, supramolecular hydrogels, which provide injectable, clinically relevant strategies for localized cancer immunotherapy. Together, these applications demonstrate the ability for self-assembled biomaterials to accomplish complex goals in vivo and mediate highly specific biomedical functions.