



Spring 2024 Seminar Series

Multiscale Control of Biomaterials for Engineered Extracellular Matrices

Dr. Adrienne Rosales

Assistant Professor, Department of Chemical Engineering at the University of Texas at Austin

Friday, April 5, 2024

9:30 - 10:30 am

Sinclair Laboratory 106

If you are attending virtually, please click the link or scan the QR code to join the meeting:

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Abstract: Engineered extracellular matrices (ECMs) are important for cellular therapies and tissue engineering applications; however, synthetic ECMs remain less structurally and biologically complex than natural ECM. In particular, the native ECM is composed of hierarchically structured biopolymers with dynamic properties that change over time. Synthetic ECMs, however, are typically formed from disordered polymers and chemistries that lead to time-invariant properties. Toward this end, we have developed bioinspired strategies to incorporate hierarchical order and dynamic behavior into synthetic hydrogels. We will discuss the chemical and physical mechanisms that lead to multiscale control in these materials, as well as their application toward matrices for human mesenchymal stromal cell culture. We will especially highlight recent work with synthetic multi-arm poly(ethylene glycol) (PEG) hydrogels with different dynamic covalent linking chemistries. These dynamic covalent hydrogels exhibit non-monotonic flow curves under steady shear, with shear thickening behavior that depends on the crosslinking bond exchange kinetics and polymer concentration. Overall, these results provide insight to the molecular and structural characteristics that govern dynamic covalent PEG gelation, mechanics, and flow, while also expanding the types of scaffolds applicable to tissue engineering and therapeutic delivery.

Bio: Adrienne Rosales is an Assistant Professor of Chemical Engineering at the University of Texas at Austin. She is a co-lead of the Interdisciplinary Research Group “Fuel-Driven Pluripotent Materials” in UT Austin’s Materials Research Science and Engineering Center. She received her B.S. in Chemical Engineering from UT Austin and obtained her Ph.D. in Chemical Engineering from UC Berkeley. After completing her Ph.D. in 2013, she trained at the University of Colorado Boulder as an NIH NRSA post-doctoral fellow. Adrienne’s group at UT Austin focuses on the development of bioinspired polymeric materials to model cellular microenvironments and engineer therapeutic technologies. This work has received emerging investigator recognitions from the Burroughs Wellcome Fund, the NIH, the NSF, and the American Chemical Society Polymeric Materials: Science and Engineering Division.

Seminars are open to all.

Attendance is required for all full-time MSE graduate students

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