



Biointerface Translation and Engineering Center

College of Engineering

UNIVERSITY OF GEORGIA

2025 Distinguished Seminar Series



Dr. Andrés J. García

Executive Director

Regents' Professor

Parker H. Petit Institute for
Bioengineering and Bioscience
Georgia Institute of Technology

**Monday, December 8th
11:00 am**

**I-STEM 2
Room 1218 (Auditorium)**

Bioengineered Hydrogels for Regenerative Medicine

Hydrogels, highly hydrated cross-linked polymer networks, have emerged as powerful synthetic analogs of extracellular matrices for basic cell studies as well as promising biomaterials for regenerative medicine applications. A critical advantage of these synthetic matrices over natural networks is that bioactive functionalities, such as cell-adhesive sequences and growth factors, can be incorporated at precise densities while the substrate's mechanical properties are independently controlled. We have engineered poly(ethylene glycol) [PEG]-maleimide hydrogels for local delivery of therapeutic proteins and cells in several regenerative medicine applications. For example, synthetic hydrogels with optimal biochemical and biophysical properties have been engineered to direct human stem cell-derived intestinal organoid growth and differentiation, and these biomaterials serve as injectable delivery vehicles that promote organoid engraftment and repair of intestinal wounds. In another application, hydrogels presenting immunomodulatory proteins induce immune acceptance of allogeneic pancreatic islets and reverse hyperglycemia in models of type 1 diabetes. Finally, photopatterned hydrogel-based microfluidic platforms have been developed using human organoids to model lymphoid-gut interactions. These studies establish biofunctional hydrogels as promising platforms for basic science research and as biomaterial carriers for cell delivery, engraftment, and enhanced tissue repair.

Andrés J. García is Executive Director of the Petit Institute for Bioengineering and Bioscience and Regents' Professor at Georgia Tech's Woodruff School. His research combines engineering, materials science, and cell biology to develop biomaterials for regenerative medicine and advance mechanobiology. This work has produced platforms for targeted tissue repair, technologies to study cell adhesion, and insights into mechanics–cell biology interactions. His innovations have led to patents, licensing agreements, and three start-ups (CollectCell, CorAmi Therapeutics, iTolerance). Dr. García has earned numerous honors, including the NSF CAREER Award, Clemson Award for Basic Science, and recognition as a top Latino educator. He is an elected Fellow of multiple organizations, including the International Union of Societies of Biomaterials Science and Engineering, AAAS, ASME, and AIMBE, and served as President of the Society for Biomaterials (2018–2019). He is a member of the National Academy of Medicine, the National Academy of Engineering, and the National Academy of Inventors.