

Winter 2025 Joint Colloquium

Materials Department & Materials Research Laboratory

Seunghyun (Seu) Sim, PhD

Department of Chemistry
University of California, Irvine

Friday, January 17, 2025
11:00 am | ESB 1001



Molecular Assembly of Living and Lifelike Materials

The Sim Lab creates and studies living and lifelike soft materials through molecularly programmed self-assembly of synthetic polymers and engineered biological components. Self-assembly is how nature seamlessly integrates cellular functionalities with complex structures of materials. For example, plants, even a 300-foot-tall giant sequoia tree, are able to grow from a small seed because cellular division is coupled with material growth through self-assembly processes. The precision and specificity of chemical dialogues within these materials enable controlled growth, response, function, and adaptation characteristics, which are lacking in synthetic materials. In this presentation, I will introduce our studies in creating new types of living materials through molecularly programmed self-assembly of synthetic polymers with engineered cells and spores. I will discuss how this approach uniquely enables the seamless integration of living functionalities such as biocatalysis in materials and dynamic and controlled behaviors.

Biography

Seu Sim is an Assistant Professor in Chemistry with joint appointments in Chemical and Biomolecular Engineering (CBE) and Biomedical Engineering (BME) at the University of California, Irvine. She received B.S. degrees in Chemistry and Biological Sciences in 2012 from Seoul National University and PhD in 2017 from the University of Tokyo, where she studied supramolecular systems using protein building blocks with Professor Takuzo Aida. She completed her postdoctoral training at Caltech with Professor David Tirrell in 2020 before starting her independent career at the University of California, Irvine. The Sim lab (simlab.com) develops living and lifelike materials and studies the biology-material interface. She received the NSF CAREER award (2023), NIH MIRA award (2023), and UCI Distinguished Early Career Award in Research (2024).

Hosted by Chris Bates and Craig Hawker