

UC San Diego

JACOBS SCHOOL OF ENGINEERING  
Aiiiso Yufeng Li Family Department of  
Chemical and Nano Engineering

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## DEPARTMENT SEMINAR

Wednesday, April 2nd, 2025

11:00 AM - 12:00 PM

SME 248

Dr. Jinhwan Kim

*“Non-invasive tracking of adoptively transferred cells for optimizing therapeutic outcome”*

Assistant Professor

Department of Biomedical Engineering

Department of Surgery

University of California, Davis



**Abstract:** Recent advancements in nanomedicine have shown the potential of the integration of nanomaterials with endogenous cells to enhance therapeutic delivery and overcome biological barriers. By functionalizing therapeutic cells with nanoparticles, these cells acquire unique physicochemical properties that allow real-time tracking and manipulation. Ultrasound-guided photoacoustic (US/PA) imaging represents a promising technique for in vivo monitoring of these nanoengineered cells. This dual-modality approach combines the deep tissue penetration of ultrasound with the high spatial resolution of photoacoustic imaging, enabling precise visualization of injected cells. Nanoparticles enhance the optical contrast for photoacoustic signals, while ultrasound provides anatomical guidance, facilitating the accurate monitoring of cell distribution and behavior. Additionally, this approach allows for controlling cell functions, offering a novel strategy to improve the efficacy and safety of cell-based therapies. In this presentation, we will discuss two examples demonstrating how the integration of functional nanoparticles with therapeutic cells can advance T cell-based and natural killer (NK) cell-based cancer immunotherapies. Our findings reveal that nanoengineered T and NK cells can be successfully detected in vivo at pre-clinical injection doses and can serve as predictors of cancer immunotherapy success by ensuring the initial infiltration of these cells into tumor masses.

**Bio:** Jinhwan Kim is an Assistant Professor in the Departments of Biomedical Engineering and Surgery at the University of California, Davis, where he leads the Laboratory for Cell Nanoengineering and is a core faculty member in the Center for Surgical Bioengineering. He earned his Ph.D. in Chemistry from POSTECH, South Korea and completed postdoctoral training in bioimaging at Georgia Tech. His research integrates nanotechnology, cell engineering, and bioimaging to enhance cell-based therapies, including immunotherapy and regenerative medicine. His group focuses on engineering therapeutic cells (e.g., stem cells, T cells, NK cells) with biocompatible nanomaterials and employing non-invasive imaging (e.g., ultrasound, photoacoustic imaging) to monitor and optimize treatment efficacy. His work aims to improve the understanding and control of these therapies, facilitating their clinical translation. Dr. Kim has received numerous awards, including the NIH (NCI) K99/R00 Pathway to Independence Award, the Hartwell Foundation Award, UC Davis Cancer Center Pilot Award, Reaching Across the Causeway Award, and recognition from SPIE Photonics West, BMES, and ACS.

Seminar Host: Jesse Jokerst