School of Molecular Sciences
Arizona State University

SMS Fall 2022 Seminar Series

Friday Oct 28 | 2:30pm | Biodesign Auditorium

Multi-Component Imaging with Engineered Luciferases and Luciferins

Bioluminescence is widely used to track cells and gene expression patterns in vivo. This technique relies on light production from luciferase enzymes and luciferin small molecules. While ubiquitous, bioluminescence has been largely limited to visualizing one or two biological features at a time, owing to a lack of easily resolved luciferase-luciferin pairs. Simultaneous monitoring of multiple cell types or gene expression patterns requires new bioluminescent tools. Toward this end, we are generating custom luciferin analogs that can be processed by unique mutant luciferase enzymes. We have developed several new probes that can be used for multi-component imaging in cells, tissues, and even whole organisms. We have also generated computer algorithms to rapidly unmix luciferase signals, enabling facile detection of multiple luciferases in vitro and in vivo. These engineered probes are now being used to image cells and decipher their communications in vivo, in addition to monitoring gene expression profiles. Examples of the imaging probes and their applications in living systems will be discussed.

Jennifer A. Prescher, PhD

Associate Professor, University of California, Irvine

Dr. Prescher received her P.D. from the University of California, Berkeley in 2006, and was a Susan G. Komen postdoctoral fellow at Stanford University 2008-2010. She is currently an Associate Professor at the University of California, Irvine.

The Prescher lab focuses on the development of chemical tools and noninvasive imaging strategies to probe immune function. The immune system comprises a vast network of disease-fighting cells that defend the body against multiple threats, but how these cells communicate over space and time to eliminate pathogens, cancer cells, and other hazards is not completely understood. The Prescher group aims to understand the complex interactions that underlie immune function by visualizing immune cells “in action”. In the lab, researchers utilize a combination of chemical and biological techniques to equip cells with various imaging probes. These probes are then used to track the movements, interactions, and functions of immune cells in whole organisms. Collectively, these studies are bringing chemistry from the test tube into living subjects, and illuminating the mechanisms employed by the immune system to combat disease.

**ZOOM option available: https://asu.zoom.us/j/87081218152*