

Imaging the Oxidation Chemistry of Cells

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The homeostasis of oxygen and its metabolites is essential to human health, but oxidative stress is connected to aging and severe human diseases ranging from neurodegenerative and cardiovascular disorders to cancer. Oxidative stress is the result of unregulated production of reactive oxygen species (ROS), and cellular mismanagement of redox-active metals like iron and copper often contributes to ROS generation and subsequent oxidative damage to cells and tissue. Motivated to understand the basic molecular mechanisms connecting cellular oxidation chemistry to physiology and pathology, we have initiated a broad-based program to develop new synthetic probes to track metal ions and ROS in living systems in real time. We will present the synthesis and characterization of our most recent fluorogenic reagents and their application for imaging cellular redox chemistry. This work is supported by startup funds from the University of California, Berkeley, the Camille and Henry Dreyfus Foundation (New Faculty Award), and the Arnold and Mabel Beckman Foundation (Young Investigator Award).