TEXAS TECH UNIVERSITY
Department of Mechanical Engineering

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Design and Synthesis of Novel Fluorescent Probes for Cellular Imaging

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Abstract: Fluorescent probes are one of the cornerstones of real-time imaging of live cells and a powerful tool to recognize many cellular processes and functions. We have developed two kinds of fluorescent probes for monitoring pH changes and Ca^{2+} signal in live cells, respectively. On the first hand, two acidic pH probes (**SCY-1** and **SCY-2**) and a near-neutral pH probe **ESCY** based on styrylcyanine were facilely synthesized and their pH-dependent optical properties were studied. Compared with the widely used pH probes, our probes displayed larger Stokes shifts, higher sensitivity and could effectively avoid the influence of cells autofluorescence due to their vis-NIR fluorescent emissions. When applied to the live cells, the significant colocalizations of **SCY-1** and **SCY-2** with LysoTracker Green DND-26 in C6 cells indicated that **SCY-1** and **SCY-2** had potential application for imaging acidic organelles in live cells [*Chem. Commun.*, 2012, 48, 11202-11204]. The fluorescent images of **ESCY** in SW480 cells at different pH buffers near neutrality also demonstrated that **ESCY** had good cell membrane permeability and could image near-neutral physiological pH fluctuations in live cells [*Journal of matericals chemistry*, 2013, in revised]. In a second set of studies, we have focus on the development of a novel emission ratiometric probe **OXD–BAPTA** for detecting intracellular $[Ca^{2+}]_i$. The main attributes of this probe are that it displays high sensitivity and selectivity for Ca^{2+} over other metal ions, a large Stokes shift and enables ratiometric emission measurement with an obvious color change. Moreover, OXD–BAPTA can track the $[Ca^{2+}]$ signal in real-time in living HUVEC cells by microscopic imaging. These special traits indicate that OXD–BAPTA is an excellent probe for intracellular Ca^{2+} signal [*Org. Biomol. Chem.*, 2013, 11, 503–508].

Speaker Bio: Shaomin Shuang is a professor at Shanxi University in China and expert of chemical biology and molecular engineering key laboratory in ministry education of China. She also is the international committee member of the Asian Cyclodextrin Chemistry. Her PhD degree received from South China University of Technology in 1998 for supramolecular chemistry. She has published more than 100 papers with citations more than 2000 times range in topic of molecular assembly, molecular recognition, fluorescent probe and chemical sensing. Additional Honors include second prize winner of the National Technology Invention of China and the first prize of science and technology in Shanxi Province.