



Kenjiro Hanaoka

My research interests are focused on the development of chemical biology tools that can be used to visualize and/or regulate biological phenomena, such as imaging probes and inhibitors. A promising approach to elucidate biological phenomena is, I believe, to design and synthesize functional sensor molecules that allow biomolecules to be monitored by spectroscopic methods. For this purpose, our group has developed many fluorescent probes and smart MRI agents for biological events, and applied them to living cells and animals. For example, although many research groups have developed probes and used them to uncover biological events in cultured cells and tissues slices, we have focused on developing the fluorophores themselves, such as silicon-substituted xanthene dyes (ex. TokyoMagenta, SiR600, etc.), and on derivatizing them to obtain novel red to NIR fluorescent probes that would open up new research approaches. Indeed, fluorescent probes including NIR dark quenchers based on fluorophores that we have developed have opened up a range of new possibilities for imaging biological processes in living cells and whole animals. Another goal of these efforts is to develop chemical tools for manipulating biological phenomena. Fluorescent probes are also useful for high-throughput inhibitor screening.

The key idea underlying my research efforts is to investigate and utilize the potential of small organic compounds to provide new chemical-biology tools that can enable precise control and visualization of biological phenomena.

Recent Selected Publications

1. Yu Kushida, Tetsuo Nagano, Kenjiro Hanaoka* (Review) "Silicon-substituted xanthene dyes and their applications to bioimaging" *Analyst*, vol.140, pp685-695 (2015).
2. Takuya Myochin, Kenjiro Hanaoka*, Shimpei Iwaki, Tasuku Ueno, Toru Komatsu, Takuya Terai, Tetsuo Nagano, Yasuteru Urano* "Development of a Series of Near-infrared Dark Quenchers Based on Si-rhodamines and Their Application to Fluorescent Probes" *J. Am. Chem. Soc.*, vol.137, pp4759-4765 (2015).
3. Kazuhisa Hirabayashi, Kenjiro Hanaoka*, Takahiro Egawa, Chiaki Kobayashi, Shodai Takahashi, Toru Komatsua, Tasuku Ueno, Takuya Terai, Yuji Ikegaya, Tetsuo Nagano, Yasuteru Urano* "Development of Practical Red Fluorescent Probe for Cytoplasmic Calcium Ions with Greatly Improved Cell-membrane Permeability" *Cell. Calcium*, in press.

