

Organic and Chemical Biology Seminar

Thursday, March 3, 2011—11:00 a.m.
1315 Chemistry

Professor Barbara Imperiali

Department of Chemistry and Department of Biology
Massachusetts Institute of Technology

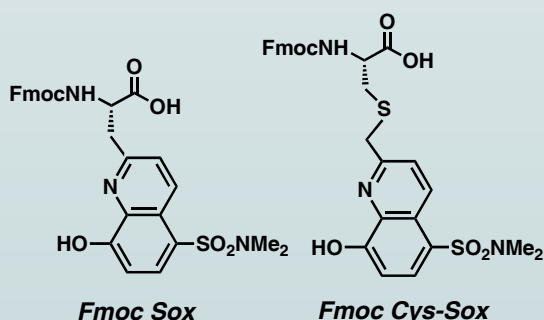


Chemical Approaches for the Study of Complex Biological Systems

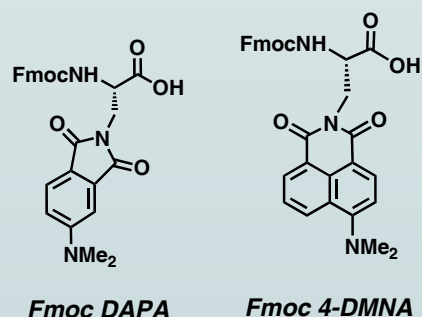
Fluorescent probes are essential in biological and medical research.^[1] These tools help to define the spatial and temporal dynamics of critical processes and also enable diagnostic analysis and rapid high throughput screening. In this presentation I will describe two multidisciplinary initiatives focused on the development of novel probes for the study of complex biological systems. First, I will present a general fluorescence-based strategy for monitoring protein kinase activities and protein phosphorylation. The abiotic probes that we have developed include sulfonamido oxines as chelation-enhanced fluorophores for interrogating the phosphorylation of specific kinase targets and can be applied for the sensitive and selective analysis of kinases in simple systems with pure enzymes as well as in crude tissue lysates from clinical samples.^[2] Second, I will present the development and applications of environment-sensitive fluorophores that are based on the aminophthalimide and naphthalimide chromophores.^[3,4,5] These heterocycles show minimal fluorescence in water, but report even subtle changes in environments with dramatic fluorescence increases. This property can be exploited for monitoring dynamic biological processes including those that are triggered by protein-protein interactions.

Fluorescent amino acid building blocks for tool development

Chelation enhanced fluorophores



Environment-sensitives fluorophores



[1] D. M. Rothman, M. D. Shults, B. Imperiali, *B. Trends Cell. Biol.* **2005**, *15*, 502-510.

[2] E. Lukovic, E. Vogel Taylor, B. Imperiali, *Angew. Chem. Int. Ed.* **2009**, *48*, 6828-6831.

[3] G. S. Loving, M. Sainlos, B. Imperiali, *Trends in Biotechnol.* **2009**, *28*, 73-83.

[4] G. S. Loving, B. Imperiali, *Biocong. Chem.* **2009**, *20*, 2133-2141.

[5] Sainlos, M.; Iskenderian, W. S.; Imperiali, B. *J. Am. Chem. Soc.* **2009**, *131*, 6680-6682