Kalyan Kumar Sadhu

Education; Oct. 2009 Ph.D. in Chemistry from Indian Institute of Technology Kanpur, India

Research area; Protein labeling by small fluorogenic tag and cell imaging studies

Key words; Protein labeling, Fluorescence Microscopy

Employment experience;

Nov. 2009 – till date GCOE Post Doctoral fellow,
Supervisor: Prof. Kazuya Kikuchi
Department of Materials and Life Sciences,
Osaka University, Japan

Education; Oct. 2009 Ph.D. in Chemistry from Indian Institute of Technology Kanpur, India
Sep. 2004 M.Sc. in Chemistry from Calcutta University, India

Awards; 2004 Sivatos Mukherjee Memorial Silver Medal
2004 Cunninghum Memorial Prize,
2004 Priyadaranjan Ray Memorial Prize
2004 Sir Upendranath Brahmachari Memorial Prize

Selected publications;

1. Sadhu K. K.; Chatterjee S.; Sen S.; and Bharadwaj P. K., Role of Spacer in Single-or Two-Step FRET: Studies in Presence of Two Connected Cryptands with Properly Chosen Fluorophores Dalton Trans., 2010, 39, 4146-4154.
2. Sadhu K. K.; Banerjee S.; Datta A.; and Bharadwaj P. K., Cryptand Cage: Perfect

Skeleton for Transition Metal Induced Two-step Fluorescence Resonance Energy Transfer Chem. Commun., 2009, 4982-4984.

3. Khan F. A.; Parasuraman K.; and Sadhu K. K. Azacrown-oxabridged Macrocycle: A Novel Hybrid Fluorogenic Chemosensor for Transition and Heavy Metal Ions Chem. Commun. 2009, 2399-2401.
4. Sadhu K. K.; and Bharadwaj P. K. Translocation of Copper Ion within the Cavity of Two New Thio-Aza Cryptands for Reversible Fluorescence Signaling Chem. Commun., 2008, 4180-4182.
5. Sadhu K. K.; Bag B.; and Bharadwaj P. K. Transition Metal Induced Fluorescence-Resonance-Energy Transfer in a Cryptand Derivatized with Two Different Fluorophores Inorg. Chem. 2007, 46, 8051-8058.

Research Statement;

The availability of green fluorescent protein (GFP) and its derivatives has thoroughly redefined fluorescence microscopy and the way it is used in cell biology and other biological disciplines. Visualization of location and properties of particular proteins GFP has been used for several years. But there are some limitations such as nonfluorogenicity etc. in protein labeling by the commonly reported methods. To overcome this issue, scientists are involved in the development of specific and turn on type fluorescence labeling system. For this purpose small molecules have been used by the scientists in recent times. This new method overcomes the drawback appeared in the previously studied systems.

My goal;

The enzymatic study of □-lactamases involves the hydrolyzation of antibiotics containing a β-lactam structure. This enzyme has been focused as a reporter enzyme in gene expression detection process among mammalian cells. The reaction of TEM-1 (Class A β-lactamases) with β-lactams involves acylation and deacylation steps. A study from Prof Kikuchi's group showed a novel protein labeling system that combines a genetically modified β-lactamase with low molecular weight fluorogenic β-lactam probes. The study involved FRET mechanism to optimize the study of the fluorogenic tag. The limitations of the process involve in the hydrophobic nature of the quencher tag and optimization of the fluorescence dye and quencher pair. To overcome the restraint in the FRET process, the new approach is based on the switching mechanism involving different techniques. Here the target hydrophilic quencher controls the emission process of the fluorophore. In this process, the second dye does not need any optimization of fluorescence dye-quencher technique.