Determination of Mitochondrial Polarity *via* Design and Synthesis of Robust, Solvatochromic and Multifunctional Fluorescent Probe

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Abstract: Water is the universal solvent of the biological kingdom. Each and every biochemical reaction happens in water. Evidently, a cell is not only a sac of homogeneously distributed molecules which are interacting with each other but extremely heterogeneous in terms of polarity, viscosity, pH, *etc*.[1] In this presentation I will be addressing a fundamental question, to what extent the polarity inside mitochondria is different than water. As a huge number of highly regulated physiochemical reactions taking place inside mitochondria and the fate of a chemical reaction highly govern by the environmental polarity.[2-3] Deciphering the microenvironment inside a particular organelle is the state of art research in the field of microscopy.[4] Alongside I will be discussing selective bioconjugation with protein and DNA.

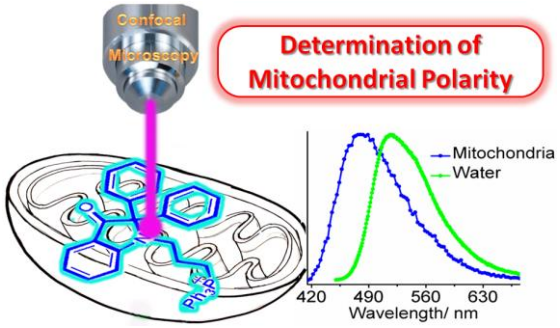

Figure 1: Spectral scanning microscopy using confocal the microscope with polarity sensitive fluorescent probe reveals the polarity inside mitochondria.

In this regard, design and synthesis of a new class of 2, 3-diketoindoline based solvatochromic propeller-shaped (Propellerocein) fluorescent dye will be discussed. The probe has been tailored with a variety of functionality including azide, alkyne, amine, alcohol, maleimide, NHS and triphenylphosphine. Bio-conjugation has been achieved with Traptavidin (avidin variant) protein and thiol-functionalized DNA. With fluorescence co-localization microscopy we confirm the specificity of our probe for mitochondria and successively determine the polarity inside mitochondria using the spectral scanning technique. We firmly believe that this result, which combines several concepts synthetic organic chemistry, fluorescence spectroscopy, fluorescence microscopy will be of great interest to the multidisciplinary and broad audience.

References:

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