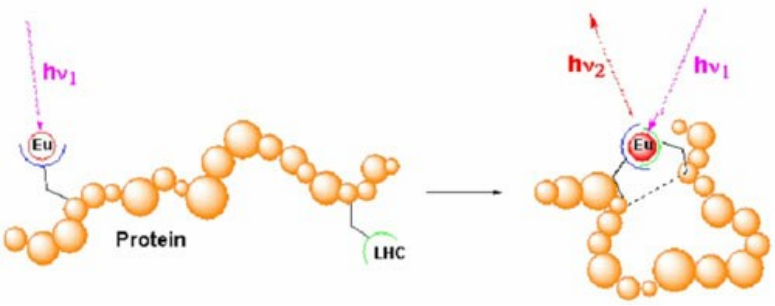
Luminescent sensors and materials

Luminescence is an extremely sensitive detection technique with wide applications ranging from bench-top clinical kits to sophisticated cell imaging spectroscopic techniques and new display technologies. Using synthetic chemistry Dr Pikramenou's group builds molecular luminescent complexes, designed to have particular photophysical properties, to tackle problems in biological and materials sciences.

Lanthanides are used as luminescent probes; they are attractive luminescent centres with emission that ranges from the visible to near IR region of the spectrum. Eu(III) and Tb(III) ions, in particular, are excellent due to their ability to emit visible light, red and green light respectively. Their luminescence has a lifetime of the order of milli-seconds and can be easily distinguished and detected from any background organic/serum fluorescence which decays in nano-seconds.

One of the challenges in clinical and biological chemistry is the direct optical detection of an interaction e.g. protein-substrate, protein folding, protein-DNA, antigen-antibody. We design lanthanide complexes in which a strong emission signal is triggered upon an interaction via a molecular recognition event. This is achieved by independently placing different ligands in specific protein sites and only when they come together does emission occur.



We also design luminescent lanthanide complexes for DNA recognition. Hairpin-shaped molecules have attracted particular interest for targeting specific DNA sequences. We use the assembly of lanthanide and transition metal building blocks that lead to metallohairpin complexes. We are interested to use these probes in cell imaging.

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