Stimulus Responsive Molecular Chromophores for Switching and Detection

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Optical and non-linear optical materials that can respond to external stimuli – for example electric field, light, redox events, pH, supramolecular binding – are critical for development of technologies from optical telecommunications and computing, through to detection of chemical/biochemical species and diagnostics for disease.

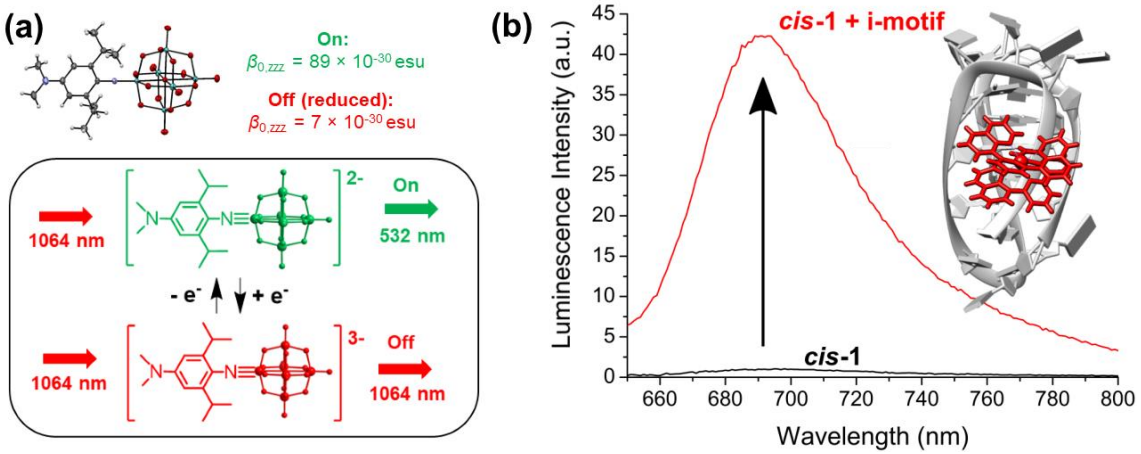

Fig. 1 (a) Redox switched 2nd order non-linear optical response in an arylimido-POM derivative. **(b)** iM DNA induced phosphorescence switch on in *cis*-$[Ru(bqp)_2]^{2+}$ (bqp = *bis*(quinoline-8-yl)pyridine).

This talk will discuss our recent work in two diverse applications of such materials. Firstly, development of redox-switched non-linear optical chromophores based on arylimido-polyoxometalates[1] – with high contrast and cyclability (Fig. 1a) – and work towards their controlled assembly at surfaces. Secondly, discovery of the first small molecule luminescent probe capable of detecting i-Motif (iM) DNA, and elucidation of its phosphorescence "switch-on" mechanism (Fig. 1b).[2]

1. B. R. Hood, Y. de Coene A. V. Torre Do Vale Froes, C. F. Jones, P. Beaujean, V. Liégois, F. MacMillan, B. Champagne, K. Clays and J. Fielden. *Angew. Chem. Int. Ed.* **2023**, *62*, e202215537.
2. P. Spence, J. Fielden and Z. A. E. Waller, *J. Am. Chem. Soc.* **2020**, *142,* 13856.