Tuning selectivity between polyphosphate anions using fluorescent metal complexes

Romain Mailhot, Stephen J. Butler.
Department of Chemistry
Loughborough University
LE11 3TU
Email: r.x.m.mailhot@lboro.ac.uk

Adenosine triphosphate (ATP) is the energy source for most biological processes and a key regulator of cellular function. The development of probes for the selective detection of ATP would allow a better understanding of the regulation of energy within the cell. Synthetic probes for anions usually comprise of a binding moiety linked via a spacer to a signalling unit.[1] Anion binding results in modulation of the signal (e.g. change in fluorescence or colour). Several probes for the detection of ATP have been synthesised over the last decade, but none have the required selectivity and functionality needed for its detection in real-time within cells, due to interference from a range of endogenous cations, anions and biomolecules.[2]

We present here synthetic approaches to new ATP-selective probes, based on a tripodal zinc complex with quinoline arms functionalised with hydrogen-bonding groups. This class of compounds has been shown to detect ATP selectively under simulated physiological conditions.[3] Here we present strategies to tune the binding selectivity and the optical response through modifications in the size of the host cavity and nature of the surrounding ligand.

References

(1) B. Valeur and I. Leray, *Coord. Chem. Rev.*, 2000, **205**, 3–40. P. D. Beer and P. A. Gale, Angew. Chem. Int. Ed. Engl., 2001, 40, 486–516.
(2) S. J. Butler and D. Parker, *Chem. Soc. Rev.*, 2012, 1652–1666. (3) S. J. Butler, *Chem. Eur. J.*, 2014, **20**, 15768–15774.