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Luminescent lanthanide chemosensors for the detection of zinc ions

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Abstract

Zinc ion, Zn(II) is an essential micronutrient to plants, animals and microorganisms. Unfortunately as Zn(II) possesses a d10 electronic configuration it is spectroscopically and magnetically inactive. In recent years the use of fluorescent based chemosensors for the detection and analysis of Zn(II) ions has gained momentum. We are interested in the use of chemosensors for the detection of Zn(II) ions in urban waterways. Whilst fluorescent based chemosensors can be used for the quantification of Zn(II) they can suffer for sensitivity and selectivity. Lanthanide based chemosensors have the potential to overcome these problems. Lanthanide based chemosensors typically have an organic chelate and an 'antenna' (Fig. 1). When the analyte of interest binds, and a time delay is introduced, background fluorescence and scattered light decay become negligible. The resulting luminescent signal is dependent only on the concentration of the luminescent probe and the target ion. We have designed a number of luminescent lanthanide chemosensors that have a 1,4,7,10-tetraazacyclododecane-1,4,7,10-tetraacetic acid (DOTA) moiety as the organic chelate and either a dipicolylamine (DPA) or quinolone moiety as the zinc binding unit and antenna. This talk will describe our research to date on the design and utility of these chemosensors and their use in the quantification of zinc in environmental samples.

Biography

Dr. Tuck completed her PhD studies in 1999 at the age of 24 from the University of Adelaide, Australia. Following this, she worked as a post-doctoral research fellow, at the School of Pharmacy, University of South Australia and University Chemical Laboratories, University of Cambridg. She took up a teaching and research position at Monash University in late 2004. Dr. Tuck's research focus is of an interdisciplinary nature and is interested in fluorescent chemosensors for the detection of anion and cations. The results of her research has been published in a total of 43 refereed journal papers.