Funding Status: Funded through EastBio (UK students)

Application deadline: 14th December 2015

Project title: 4 year EastBio PhD in the development of artificial metalloenzymes for catalytic C-H amination

Project description:

The direct functionalization of C-H bonds is a major area of interest as it will allow access to more sustainable chemical processes through the reduction of waste. It also promises to provide a method towards providing value to hydrocarbon feedstocks beyond just utilizing them as fuel. The use of catalysis will be essential to solving this problem, and chemists from all areas of catalysis (homogenous, heterogenous and enzymatic) have made great strides forward. For example, in C-H oxidation, homogenous catalysis has provided methods for the selective late-stage oxidation of complex or activated molecules. Complementary to this, in an enzymatic catalytic approach P450 systems have been explored to perform regioselective oxidation of alkanes, where the region selectivity is dependent on the P450 mutant used. Current work in the Kamer group is focused on combining the best of homogenous and enzymatic catalysis through the creation of artificial metalloenzymes to perform C-1 selective alkane oxidation. Amines are also valuable target compounds alongside alcohols, both of interest as reactive intermediates and due to their prevalence in nature. This project will expand our work on artificial metalloenzymes towards C-H amination, a reaction almost unknown in natural systems.

Students interested in undertaking a PhD in the Kamer group in this research area should register their interest as soon as possible. More information on the EastBio PhD program and how to apply is available via their website (http://www.eastscotbiodtp.ac.uk/). Informal enquiries can be made to Prof Paul Kamer (pcjk@st-andrews.ac.uk).

Potential applicants are welcome to arrange to visit St Andrews at any time, although there will be a chemistry postgraduate open day in St Andrews on the afternoon of Friday the 12th of February 2016.
Please see: http://ch-www.st-andrews.ac.uk/PGadmissions.html for the application procedure or e-mail chempg@st-andrews.ac.uk for more information

References:

1. a) M. V. Doble, A. C. C. Ward, P. J. Deuss, A. G. Jarvis, P. C. J. Kamer, *Bioorg. Med. Chem.* 2014, **22**, 5657; b) P. J. Deuss, G. Popa, C. H. Botting, W. Laan, P. C. J. Kamer *Angew. Chem., Int. Ed.* **2010**, *49*, 5315; c) P. J. Deuss, G. Popa, A. M. Z. Slawin, W. Laan, P. C. J. Kamer, *ChemCatChem* 2013, **5**, 1184-1191.
2. T. K. Hyster, C. C. Farwell, A. R. Buller, J. A. McIntosh, F. H. Arnold, *J. Am. Chem. Soc.* 2014, **136**, 15505-15508.
3. Creus, M.; Ward, T. R. *Org. Biomol. Chem.* **2007**, *5*, 1835.

Subject area: Catalysis, Inorganic chemistry, Organic chemistry, Synthetic chemistry