A FULLY-FUNDED 3 YEAR PHD SCHOLARSHIP IS AVAILABLE FROM OCTOBER 2018

From biomass to fuel: Capturing the structural dynamics of catalysis in biomass degrading metalloenzymes

Deconstructing plant biomass is becoming a major industrial route to access “renewable” carbon to create biofuels and chemicals which can be used as precursors for pharmaceuticals. A bottle-neck to these processes is the recalcitrant nature of the components of plant biomass which pose a considerable chemical challenge to breakdown. Microbes such as *Streptomyces* secrete enzymes which act to deconstruct plant biomass in their natural habitats. Harnessing the catalytic power of these enzymes to create ‘cocktails’ for biotechnology applications is a major global initiative to achieve a low-cost carbon economy and other commodities for a greener future.

At Essex, we have been working on two families of metalloenzyme secreted from the industrially used strain *Streptomyces lividans* that through distinct oxidizing mechanisms have great biotechnological potential to deconstruct plant biomass to give value added products. These enzymes belong to the dye decolourising haem peroxidase (DyPs) family and the copper containing lytic polysaccharide monooxygenase (LPMOs) family (**Fig. 1**). For both enzyme families, many aspects of their catalytic mechanism and interaction with substrate that will benefit their application in biotechnology are not well defined.

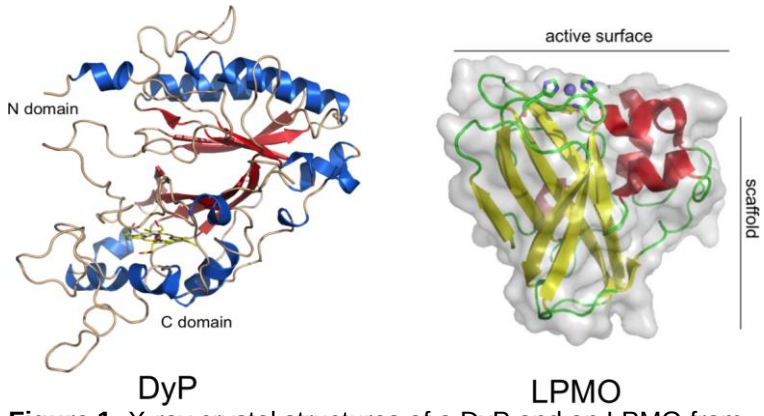

Figure 1: X-ray crystal structures of a DyP and an LPMO from *S. lividans*.

The overarching aim of this PhD project is to provide detailed understanding of the biochemistry and structural dynamics of DyP and LPMO enzymes from *S. lividans*. This will require determining the salient features of the catalytic intermediate states in each enzyme, using structural and fast reaction methodologies (including X-ray free electron laser (XFEL) and synchrotron time-resolved crystallography instruments) as well as EPR spectroscopy.

The successful applicant will enter a vibrant community of scientists with extensive expertise in molecular biology, recombinant protein production and purification, fast reaction kinetics covering both optical and EPR spectroscopies, protein crystallization and cutting-edge structural biology technologies using synchrotron and X-ray free-electron laser (XFEL) facilities. Training in all these areas will be provided as well as participating in excellent training opportunities through use of external facilities e.g. Diamond Light Source, UK. and the SACLA XFEL in Japan.

Entry requirements and application procedures
Informal queries may be addressed in the first instance to Dr Mike Hough mahough@essex.ac.uk, Dr Jonathan Worrall jworrall@essex.ac.uk, Dr Richard Strange rstrange@essex.ac.uk or Dr Dima Svistunenko svist@essex.ac.uk

Applications should be submitted electronically by **28th February 2018**. See https://www.essex.ac.uk/pgapply/enter.aspx for details. The intended start date for this 3-year, fully-funded PhD studentship is 4th October 2018. This scholarship will be to the value of £14,553 per annum plus UK/EU tuition fees.

Please note: International students need to have additional funding to cover the difference in tuition fees which is £11,815.00, evidence will be requested that you have these additional funds.

Applicants should write 500 words explaining why they are interested in this project and submit this with their CV.

This scholarship is generously supported by a bequest from the estate of Professor Peter Nicholls (https://www.theguardian.com/theguardian/2014/dec/30/peter-nicholls-obituary**)**

The University of Essex
In the recent Research Excellence Framework 77% of research at the University of Essex research is 'world leading' or 'internationally excellent' (REF 2014).We offer world-class supervision and training opportunities and our research students work at the heart of an internationally-acknowledged and well-connected research community. In the 2013 Postgraduate Research Experience Survey, 84% of respondents said that they were satisfied with the quality of their research degree. At Essex we win awards for our pioneering student support schemes. We are the most recent winners of the prestigious *Times Higher Education* award for Outstanding Support for Students. Essex is a genuine global community. With more than 130 countries represented within our student body, and 40% of our students from overseas, we are one of the most internationally-diverse universities in the UK.