Dr Simon Daff
Lecturer in Bioinorganic Chemistry

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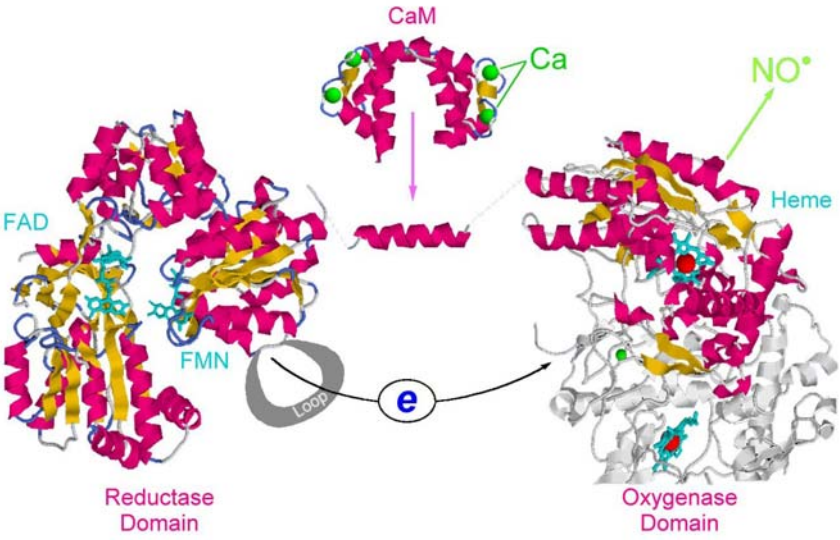
Research Interests: NO synthase, biological electron transfer, bioelectrochemistry, enzyme mechanisms.

Our research is focused on understanding and controlling the mechanisms of redox enzymes: (1) Mammalian NO synthases are large multidomain enzymes involved in the regulation of blood flow/pressure, immune response and nerve signalling. We aim to understand their mechanisms of action on the molecular level and find new ways to control their activity through inhibition or activation. (2) Heme-dependent monooxygenases are powerful catalysts, able to insert oxygen atoms specifically into otherwise unreactive molecules. We are examining the energetics of this process and remodelling the enzymes to trap reactive intermediates and to gain control over their function. (3) Using robust electron transfer proteins, we are building protein-based electron transfer wires for use in enzyme electrochemistry and in the construction of novel electroactive enzymes.



We use a combination of specialist techniques allied to standard protein biochemistry, including: Rapid-reaction kinetics, protein engineering through chemical and genetic manipulation, spectroscopy, electrochemistry and X-ray crystallography.

SELECTED RECENT PUBLICATIONS

1. "Nitric Oxide Synthase: Structures and Mechanisms" Daff, S. (2010) *Nitric Oxide: Biology and Chemistry 23,* 1-11.
2. "Conformational Equilibria Control the Calmodulin Dependence of Neuronal NO Synthase Reductase Domain" Welland A. and Daff, S.* (2010) FEBS J. 277
3. "Steady-state and Stopped-flow Kinetic Studies of Three E. Coli NFSB Mutants with Enhanced Activity for The Pro-Drug CB1954" Jarrom, D., Jaberipour, M., Guise, C.P., Daff, S., White, S.A., Searle, P. F. and Hyde, E. (2009) *Biochemistry 32,* 7665-7672
4. "Importance of the Domain-Domain Interface to the Catalytic Action of NO Synthase Reductase Domain" Welland A., Garnaud, P.E., Kitamura, M., Miles, C.S. and Daff, S.* (2008) *Biochemistry 47*, 9771-9780.