Department of Chemistry

PhD Studentship
Professor Patrick Unwin

**PhD project:** BBSRC iCASE: Understanding Tooth Decay at the Nanoscale and the Development of Next Generation Treatments

**Supervisors:**
- *Academic supervisor:* Prof Patrick Unwin (Chemistry, University of Warwick)
- *Co-supervisors:* Drs Gareth Owens & Andrew Joiner (Unilever Port Sunlight Laboratory)

**Funding availability:** Funded PhD Project (UK Students Only)

**Deadline:** 30th June 2021

**Start date:** October 2021

**Project description:**
Are you looking for an exciting PhD project that involves problem solving and interdisciplinary research? Would you like the chance to strengthen your expertise and expand your skill set? This partnership between the University of Warwick and Unilever will provide a chance to tackle an important societal problem (what causes tooth decay and how can it be better treated?) and learn many desirable scientific skills of wide applicability, embracing electrochemical methods, microscopy, instrumentation, surface chemistry, scientific programming and data visualization. The Warwick Electrochemistry & Interfaces Group (PI Prof. Pat Unwin), where the project is based, is an international and interdisciplinary group which provides a supportive environment, with an enviable track record of empowering students, who gain excellent positions after graduation. There will be opportunities to build a network, working with scientists at Warwick and some of its collaborators, and Unilever and associated companies. You will also have the opportunity to become an affiliate member of the Centre for Doctoral Training (CDT) in Analytical Science at Warwick and take courses of interest to you from many offered by Warwick’s CDTs.
Dental caries (tooth decay) is the most common non-communicable disease in the world, affecting many millions of people, and initiated by microbial processes that drive enamel demineralisation. In this project we shall investigate the mechanistic basis of the initial enamel demineralisation events, under lab conditions relevant to enamel surface physiology, to develop strategies that protect and repair enamel. In particular, we shall test the hypothesis that biological acid type dictates the pattern and severity of enamel demineralisation. The project will involve the further development of state of the art techniques to probe surface biochemical processes at the nanoscale. You will gain experience in experimental and modelling methods, and the work will assess new treatments for caries (in collaboration with Unilever scientists).

The Warwick Electrochemistry & Interfaces Group is world leading for the invention and implementation of nanoscale methods to study surface processes. Unilever has developed applicable bulk tissue testing techniques in parallel, enabling the nano-world to be linked practical developments. Significant infrastructure for the project is available at Warwick (in Pat Unwin’s group and in various Warwick research technology platforms which are readily accessible) and at Unilever, including at the Materials Innovation Factory (MIF) in Liverpool. Pat Unwin’s group has collaborations around the world and publishes in top journals on a range of topics in the physical and life sciences.

Requirements:
This 4 year project is suitable for students with a background in most areas of science (Chemistry, Physics, Engineering, Biology/Biochemistry, Pharmacy, Maths) and the successful applicants will have a minimum of a 2:1 first degree in one of these subjects. The studentship is well funded with a stipend of £19,609 per year (in 2021/22), along with generous funding for the project.

How to apply:
For further details please contact Professor Patrick Unwin:
p.r.unwin@warwick.ac.uk
www.warwick.ac.uk/electrochemistry