

Title

Delivering new insights for health and life sciences with solid-state NMR

Description

Nuclear magnetic resonance spectroscopy (NMR) is a versatile structural technique that can probe biomolecules at the atomic lengthscale. In particular, solid-state NMR enables investigation on a wide range of biological materials, from whole cells to tissue samples, with the potential of studying the structure, composition, and molecular mobility of biomolecules within a native-like environment.

The research interest of the Chow lab focuses on developing new applications for solid-state NMR for investigating the extracellular matrix (ECM). The ECM is an extremely diverse class of biological materials that is often inherently insoluble and heterogeneous, making it challenging to address using more traditional approaches. Previously, our work has shed light on mechanisms of formation of hard tissue such as bone, and uncovered new routes of tissue degeneration from studying cartilage tissues from patients affected by osteoarthritis and alkaptonuria. More recent work in the Chow lab involves several collaborators at Warwick Medical School (WMS) and the University Hospitals Coventry and Warwickshire (UHCW), focused on analysis of ECM obtained via fungal and mammalian cell culture.

This experimental PhD project is expected to align with one or a few ongoing collaborations, ranging from female reproductive health, molecular mechanism underlying Ehlers-Danlos syndrome, and cell wall-based adaption strategies of the fungus *Aureobasidium pullulans*. In particular, the fungal adaption collaboration is recently supported by Wellcome funding with Mohan Balasubramanian of WMS.

The project aims to use solid-state NMR to bring unique insights that can be eventually translated into improved medical and clinical treatments. By working on a range of ECM samples, the student will develop skills and expertise in solid-state NMR characterisation that is transferable to a broad spectrum of biological problems. Depending on interest, the student can also be trained in the production and isotopic enrichment of one or more different types of ECMs, use complementary analysis techniques, or develop a shared database of research data for ECM samples.

This project will use the world-leading solid-state NMR facility at the University of Warwick, including the High-field National Research Facility based at Millburn House (go.warwick.ac.uk/850mhz). This project will also make use of the facilities and training offered by the Research Technology Platforms at Warwick (spectroscopy, proteomics).

This PhD studentship is available for starting in October 2027. To discuss this project further contact:

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Lab website: wychowlab.org

Solid-state NMR at Warwick: go.warwick.ac.uk/NMR