

## U-RHYTHM: A novel technology for investigating dynamics of ultra-hydrophobic sex and thyroid hormones in humans

(Jointly between Bristol Chemistry & Bristol Medical School)

**Use state-of-the art chemistry techniques in collaboration with health science researchers, clinicians, and design engineers to optimise a novel sampling technology for understanding hormone dynamics crucial to normal growth and development**

**About the project:** This interdisciplinary collaboration between chemistry, translational health sciences, design engineering and clinical medicine aims to enable blood-free ambulatory measurement of ultrahydrophobic hormone compounds crucial for normal growth and development as part of 'at home' dynamic assessment, meeting the direct need of clinicians as part of disease diagnosis and treatment.



Rhythms characterise all living things, and our physiology can be a considered as a state of continuous dynamic equilibrium. Despite this, almost all clinical tests of human health consist of single time point measurements, which inevitably do not reflect normal and inherent daily or even hourly variation. To overcome this, we have developed a novel technology allowing 24-hour ambulatory, minimally invasive, blood free sampling (U-RHYTHM, [www.designworks.studio/ultradian-u-rhythm](http://www.designworks.studio/ultradian-u-rhythm), [www.u-rhythm.co.uk/](http://www.u-rhythm.co.uk/)). Using the technique the dynamics of adrenal hormones including the stress hormone cortisol in hundreds of human participants ([www.ultradian.eu](http://www.ultradian.eu)) can be monitored.

**The challenge:** Sex and thyroid hormones are crucial to normal growth and development, but their ultrahydrophobic chemistry currently makes their measurement with U-RHYTHM difficult. The aim is to enable the U-RHYTHM technology to overcome this problem.

**Why choose this opportunity?** The student will undertake a multidisciplinary programme – using state of the art physical chemistry methods to functionalize and characterize the hydrophobic surfaces of U-RHYTHM fluidic systems and to describe the interaction of hormones with the U-RHYTHM microdialysis system, with the potential for conducting proof-of-principle clinical trials in human participants. The project will be based at the University of Bristol within the Labs for Integrative Neuroscience and Endocrinology and the School of Chemistry. You will develop expertise in quantitative physicochemical techniques and microdialysis technology, as well as an understanding of dynamic regulation of human hormones. Our groups are highly international and dynamic, with extensive industrial and academic links in the UK and worldwide. You will have the opportunity to interact and collaborate with the members across the group, developing transferrable skills. Specifically, we will have the opportunity to collaborate with our partners in Norway, Sweden and Greece to implement your knowledge in real applications. Your professional and personal development, as well as enriching cultural experience, is central to the training programme. You will be supported throughout the project through individual and group meetings, graduate courses, and technical training, tailored to your specific needs. You are encouraged and supported to present your work at international conferences publish your work at international journals.

**About you:** Skills and knowledge in bioanalytic methods, physics, materials, chemistry, analytical methods, and colloid science are desirable but not essential. Training will be provided.

**Bench fees:** A bench fee of £4000 is required. A small number of School of Chemistry Bench fee bursaries are available to part-cover bench fees.

**How to apply:** Applications are accepted throughout the year and you should complete the online application form for Chemistry (MSc by Research).

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