UCD School of Mechanical and Materials Engineering
Scoil na hInnealtóireachta Meicniúla & Ábhar UCD

DYNAMIC BIOMATERIALS

Fully Funded 4-year PhD Position - Biomaterials Science and Computational Methods

Modelling the role of mechanical forces in cell growth and differentiation in multi-cellular systems using discrete element modelling and cell-based experiments.

The Dynamic Biomaterials group at University College Dublin, led by Dr Zarah Walsh-Korb, is seeking to hire a PhD student from early 2026. Our lab focuses on the rational engineering of stimuli-responsive biomaterials that can enhance and influence growth in multicellular systems, specifically organoids. These matrices not only allow us to culture physiologically relevant biological systems but also to provide insights into mechanobiological factors in development and disease. We are particularly interested in the mechanics and function of in vitro models of the gastrointestinal tract, and the focus of this project will be modelling and shaping growth in intestinal organoids.

The proposed project will combine design and physical characterisation of stimuli-responsive biomaterials for 3D culture, biological characterisation of cultured organoids and discrete element modelling (DEM), to probe how mechanical signals from the matrix shape cell fate decisions and ultimately organoid morphology and function. This is an interdisciplinary project bridging materials science, organoid biology and computational methods. The selected candidate will work closely with the Multicellular Systems Dynamics Lab of Prof. Dr Bart Smeets at the KU Leuven in Belgium. They will provide key support to the candidate in understanding the complexities of DEM, while the Dynamic Biomaterials Lab at UCD will provide training on materials design/characterisation and organoid culture. The project is based at UCD; however, it is envisioned that the selected candidate will visit Leuven at various stages of the project to undertake training with relevant software for DEM of biological systems and explore results as the project develops.

The ideal candidate will have a Master's degree (or equivalent) in mechanical engineering, computational mechanics, biomedical engineering or a related field. Prior experience in DEM is essential. Application of DEM to biological systems or soft matter is an advantage, as is familiarity with biomaterials synthesis/characterisation, multicellular systems or cell biology. DEM experience in a relevant context will be a deciding factor in the selection of the final candidate.

The PhD position is a 4-year position funded by the School of Mechanical and Materials Engineering at UCD at the standard government stipend level of €25,000 (tax-free) with coverage of tuition fees for both EU and non-EU students available. A research budget is available for associated research costs. Students will be enrolled in UCD's structured PhD programme, which includes taught elements and transferable skills training, providing an excellent foundation for a research career. For more information, visit (www.ucd.ie/graduatestudies/researchstudenthub/researchprogrammes/).

About the group: Dr. Zarah Walsh-Korb is Associate Professor of Sustainable Functional Materials in the School of Mechanical and Materials Engineering, Fellow of the Conway Institute, and Principal Investigator in the UCD Centre for Biomedical Engineering. She leads the Dynamic Biomaterials group, which moved from the University of Basel to UCD in May 2025. The Dynamic

Biomaterials group focuses on multi-length scale investigations of biomaterials behaviour, how materials can instruct cell growth and the role of mechanics in development and disease. Our lab is small, but it is growing, so the hired candidate will not only contribute to scientific research but will help shape the lab culture, scientific direction and collaborations of the group. We are committed to providing a supportive and inclusive work environment, where diverse backgrounds and interdisciplinary research thrive.

If this sounds like the right position for you, please use this Google Form link to submit a short motivation statement (outlining your relevant experience), your CV, academic transcripts and the names and contact details of 2 referees, no later than February 17th 2026. Interviews are expected to take place per video call in March 2026. Please note email applications will not be accepted.