SUSTAINABLE MATERIALS LAB
DEPARTMENT OF CHEMICAL ENGINEERING @KULAK
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Postdoctoral position in rheology on physical hydrogel wound dressing development

Sustainable Materials Lab
KU Leuven

Postdoctoral position: 24 months, starting as soon as possible

Workplace

The Sustainable Materials Lab (SUSMAT) – Prof. Wim Thielemans, Department of Chemical Engineering, KU Leuven Campus Kulak Kortrijk, Kortrijk, Belgium,
and
the Soft Matter, Rheology and Technology group (SMART) – Prof. Christian Clasen, Department of Chemical Engineering, KU Leuven (Arenberg) Campus, Leuven (Heverlee), Belgium

Work Environment

This project will be carried out within the SUSMAT group (Department of Chemical Engineering) of Prof. Wim Thielemans. Actual experimental work will be carried out in the SMART group with Prof. Christian Clasen, located at the Science and Engineering Leuven (Heverlee) campus. The research group combines fundamental research with the development of applied materials from sustainable sources. The SUSMAT group is interdisciplinary and combines knowledge from a molecular level over processing and characterization of the materials.

The SUSMAT group has fully equipped wet chemical labs, elemental analysis, size exclusion chromatography (SEC), light scattering, small and wide-angle x-ray scattering (S/WAXS), x-ray photo-electron spectroscopy (XPS), dynamic scanning and isothermal titration calorimeter (DSC and ITC), and access to nuclear magnetic resonance (NMR) spectroscopy and electron microscopy facilities. Our research group at current consists of 9 PhD students, 7 postdoctoral researchers, a research and an Industrial Research Fund manager as well as a technician, and we also have numerous international scientific collaborations.
The SMART group is a world-leading laboratory on spectro-mechanical characterization of complex fluids and soft matter, comprising a diverse array of state of the art traditional (rotational and capillary) rheometers, as well as various techniques to measure elongational properties of low viscous liquids and highly viscous polymer melts. It is also equipped with a wide range of set-ups to characterize flow-induced microstructure, including microscopic techniques, light scattering and rheo-optical techniques.

Topic

Our team is currently developing a wound healing dressing based on the physical gelation of a naturally occurring saponin compound in water. This saponin is already used as a gelator and gel-forming agent in foodstuffs, and in wound healing gels, it has a dual action as it acts

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as the gelator and also displays anti-inflammatory properties. The proven excellent wound healing capabilities (murine and porcine studies) have gained the attention of the pharmaceutical industry and we received funding to commercialize this wound dressing in collaboration with a pharmaceutical formulation development company. It is therefore paramount to gain a better understanding of structure development in the physical hydrogels and the effect of composition and history on the rheological properties of the gel, including over time.

Objectives of the project

The aim of the project is to gain a fundamental understanding of the rheological behavior and structure development of the physical aqueous hydrogels via traditional rheological measurements, rheo-optical techniques, small angle X-ray scattering, DSC, etc. The effect of composition and environment (e.g. pH) will be studied as well as time-dependent effects (e.g. ageing, deformation history). The postdoctoral researcher will prepare new hydrogel formulations, tune current formulations, and investigate the effect of the addition of extra active components to the current formulations. While these studies are focused on the development of our gel formulations for wound healing applications, the fundamental understanding of the behavior of these formulations is required to unlock the full potential of these hydrogels.

Profile of the candidate

We seek an enthusiastic scientist with a PhD in Chemistry/Chemical Engineering/Materials Science with a proven experience in physical hydrogel structural and rheological characterization. Established knowledge of standard and advanced rheological characterization techniques as well as relevant chemical and physical characterization techniques (SAXS, DSC, optical polarized light microscope) is a plus.

The candidate should also be motivated to combine both fundamental and applied research towards the development of a novel wound dressing.

Application details

Please send a CV, a cover letter and the contact information for 2 references to Wim Thielemans (wim.thielemans@kuleuven.be). You can also contact Wim Thielemans to request additional information or with any questions you may have.