THE PHYSICS COLLOQUIUM

Thursday 11 May 2023, 4:00 p.m.
Nijenborgh 4, **Lecture Hall 5111.0080**

Bioinspired thiol-mediated crosslinking enables covalent adaptable hydrogels with dynamic behavior as extracellular-matrix mimics

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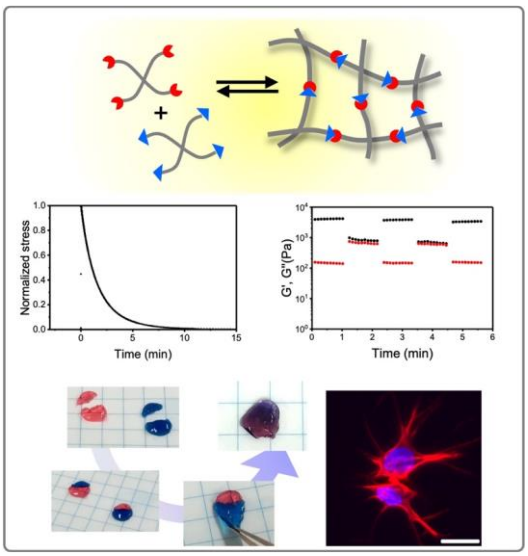

Hydrogels are versatile materials that can be used for a broad range of biomedical applications. Due to their high water content, good permeability, and tunable mechanical properties, hydrogels can be used as extracellular matrix mimics for applications in tissue engineering. There is currently a growing body of literature demonstrating that, for the aforementioned applications, the control of the viscoelastic properties of hydrogels (i.e., self-healing, stress relaxation) is crucial for adequate material's performance.

One strategy recently implemented to control the viscoelasticity of hydrogels is the use of dynamic covalent chemistry (DCC) as crosslinking strategy. When introduced as crosslinks in a polymeric network, DCC imparts time-dependent viscoelasticity to the resulting hydrogel, which timescale depends on the DCC bond lifetime. Notably, DCC crosslinks can give access to a wide range of time scales, contrary to covalent static or physical crosslinks, leading to more versatile materials. When combined with cells, these DCC hydrogels can be used to generate artificial tissues, whereby cell behavior can be influenced by the selected DCC-crosslinks.

In my presentation, I will show a novel type of thiol-based DCC as a crosslinking strategy to form tunable, dynamic hydrogels. The system showcases the use of polyethylene glycol (PEG) precursors for the preparation of DCC hydrogels under physiological conditions. The innovative materials display a convenient gelation time and tunable mechanical properties such as stiffness, self-healing and stress- relaxing behavior, and support the 3D culture of stem cells. These studies pave the way for the investigation of these DCC hydrogels as advanced cell culture models that closely mimic the native situation.

Join us for coffee starting 3:30 p.m. Refreshments will be served after the lecture.
For more information contact the host: Andrea Giuntoli (a.giuntoli@rug.nl)
Website: http://www.rug.nl/research/vsi/colloquia/