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Adaptable polysaccharide hydrogels with reversible boronate ester crosslinks: control of the mechanical properties through the synthetic manipulation of the small molecule crosslinkers

Adaptable hydrogels, built through dynamic covalent bonds, have recently emerged as a promising platform for tissue engineering and regenerative medicine [1,2]. The dynamic nature of the crosslinks in these polymer networks enables them to have shear-thinning (viscous flow under shear stress) and self-healing (recovery upon relaxation) characteristics. Therefore, adaptable hydrogels can be used as injectable scaffolds for minimally invasive delivery of cells and in the filling of irregular defects. The fast and stable bond formation between boronic acids and sugars to form boronate esters has been successfully used by our group for forming such injectable and self-healing hydrogels from hyaluronic acid (HA), a polysaccharide that is ubiquitous in the human body.[3] In these networks, gel properties are closely tied to the structure of the small molecule crosslinkers, i.e. the phenylboronic acid (PBA) and sugar moieties grafted on HA. Given the advantages offered by such hydrogels for biomedical applications, we sought to gain a better understanding of the relationships between molecular and hydrogel network properties, to control the macroscopic mechanical properties through the synthetic manipulation of the small molecule crosslinkers. In this presentation, we will show how the binding mode of boronic acids to saccharide moieties affects the mechanical properties of the HA-based hydrogels, which paves the way for the rational design of injectable hydrogels with tailored mechanical properties.

1. D. L. Taylor, M. in het Panhuis, *Adv. Mater.* 28 (2016), 9060-9093.
2. H. Wang, S. C. Heilshorn, *Adv. Mater.* 27 (2015), 3717-3736.
3. D. Tarus, E. Hachet, L. Messager, B. Catargi, V. Ravaine, R. Auzély-Velty, *Macromol. Rapid Commun.* 35 (2014), 2089-2095.

Preferred topic

Gels and nanoparticles

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