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Biobased polymer hydrogels. Challenges & strategies

The employment of biobased polymers, specifically, those extracted from the biomass (polysaccharides such as chitosan, alginate or agarose and proteins such as gelatin) is of particular interest for the development of biomedical applications. This is motivated on the one hand by the fact that many biobased polymers are able to assemble in water in response to different stimuli (pH, temperature or ionic concentration) to give rise to hydrogels in the form of macro, micro and nanogels. On the other hand, their intrinsic characteristics, biocompatibility and biodegradation properties make them suitable for applications in drug delivery or tissue engineering among others. In this communication, an overview of the research done in our group regarding hydrogels obtained from biobased polymers, structure-properties relationship and their biomedical applications will be presented. It concerns in particular the preparation of nanocomposite hydrogels in which the polysaccharide acts as encapsulating matrix or as template for the synthesis of metallic nanoparticles, combination with stimuli responsive hydrogels to obtain dual responsive interpenetrating polymer hydrogels or multilayer combinations obtained through electrostatic interactions between polyelectrolytes. Results on the influence of the structural organization of nanoparticles within polysaccharide hydrogels as determined through synchrotron techniques onto rheological and functional properties will be shown [1]. Finally, some selected applications in controlled drug release and magnetic hyperthermia will be presented [2,3].

1. R. Hernandez, R. et al., *Soft Matter* 6 (2010), 3910-3917.
2. T.C.d. Santos et al., *Europ. Polym. J.* 99 (2018), 456-463.
3. V. Zamora-Mora et al., *Carbohydr. Polym.* 157 (2017), 361-370.

Preferred topic

Gels and nanoparticles

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