Polyurea-crosslinked Biopolymer Aerogels – Synthesis, Properties and Applications

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Biopolymer aerogels are attractive materials because they: (a) come from natural resources; (b) are synthesized in water; (c) bear a large number of functional groups available for coordination to metal ions; (d) are biocompatible, biodegradable and non-toxic; and, (e) can be converted pyrolytically to carbon aerogels with ultra-high open porosities and surface areas [1,2,3]. The main drawback of all biopolymer aerogels, however, is that they are mechanically-weak materials. This was rectified recently by the synthesis of polyurea/polyurethane-crosslinked calcium alginate (X-alginate) aerogels [4]. X-alginate aerogels can be as stiff as most organic aerogels at half or the one third of their density. Although X-alginate aerogels are essentially co-polymers, the relative topology of the alginate and the crosslinker is defined at the nanoscopic scale rather than at the molecular level.

In this presentation, we will discuss the synthesis and characterization of robust polyurea-crosslinked biopolymer aerogels based on alginate and chitosan, and their application in environmental remediation.

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