

Recent progress on the design and applications of polysaccharide-based graft copolymer hydrogels as adsorbents for wastewater purification

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ABSTRACT:

Gum polysaccharides are one of the most abundant bio-based polymers. They are generally derived from plants as exudates or from microorganisms and have diverse applications in many industries, especially in the food industries where they are used as emulsifiers and thickeners. In their natural form, gum polysaccharides have poor mechanical and physical properties; therefore, they are frequently modified with various synthetic monomers such as acrylamide and acrylic acid using graft copolymerization. Graft copolymerization is one of the most trusted and widely used synthetic methods for the modification of gum polysaccharides. Gum polysaccharides modified in this way have improved mechanical and physicochemical properties. Furthermore, gum polysaccharides contain a variety of functional groups, for example, carboxylic acid and hydroxyl groups; therefore, they have been used extensively as adsorbents for the removal of different impurities from wastewater such as toxic heavy metal cations and synthetic dyes. Here, the chemical and physical properties of gum polysaccharides, different methods of graft copolymerization, and the use of graft copolymer gum-polysaccharide-based hydrogels are reviewed in detail for the removal of toxic heavy metal cations and synthetic dyes from aqueous solutions.