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Synthesis of glycogen and poly (acrylic acid)-based graft copolymers via ATRP and its application for selective removal of Pb²⁺ ions from aqueous solution

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Highlights

Glycogen and *poly* (acrylic acid)-based graft-copolymer was prepared via ATRP.

Optimizing reaction parameters, well-defined copolymers with high M_n and low PDI were obtained.

Copolymer removed Pb²⁺ selectively and efficiently from various metal ions contaminated water.

Abstract

We report the development of a novel graft copolymer, glycogen-*graft-poly* (acrylic acid) (g-Gly/pAA) with high molecular weight and low PDI, has been synthesized by ATRP using CuBr/bpy catalyst. The copolymer demonstrates its potential application for selective removal of Pb²⁺ over other metal ions (Cd²⁺, Cu²⁺, Ni²⁺ and Zn²⁺). The hydroxyl groups present on glycogen were used to initiate the ATRP of acrylic acid (AAc). ¹H and ¹³C NMR spectroscopic analyses predict the probable structure of copolymer and a likely mechanism for copolymer formation has been proposed. High molecular weight and low polydispersity index of g-Gly/pAA obtained from gel permeation chromatography signifies the controlled/living polymerization of AAc through ATRP. Surface properties of the

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