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PII: S0014-3057(15)00036-1
DOI: http://dx.doi.org/10.1016/j.eurpolymj.2015.01.024
Reference: EPJ 6718

To appear in: *European Polymer Journal*

Received Date: 12 January 2015
Accepted Date: 15 January 2015

Please cite this article as: Pal, A., Das, D., Sarkar, A.K., Ghorai, S., Das, R., Pal, S., Synthesis of glycogen and poly (acrylic acid)-based graft copolymers via ATRP and its application for selective removal of Pb^{2+} ions from aqueous solution, *European Polymer Journal* (2015), doi: http://dx.doi.org/10.1016/j.eurpolymj.2015.01.024

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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 Pb^{2+} 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 Pb^{2+} over other metal ions (Cd^{2+}, Cu^{2+}, Ni^{2+} and Zn^{2+}). The hydroxyl groups present on glycogen were used to initiate the ATRP of acrylic acid (AAc). ^{1}H and ^{13}C 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