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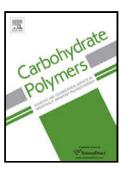
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ACCEPTED MANUSCRIPT

Electroactive polyaniline/silica hybrid gels: controllable sol-gel transition adjusted by chitosan derivatives

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Highlights

 1. The sol-gel transition of electroactive gels can be controlled by polysaccharide derivatives.

• 2. There is no organic solvent in the process of prepared hybrid gels.

• 3. Good biocompatibility and low toxic for the encapsulated enzyme or protein.

 4. Good redox electroactivity. The polyaniline could be well compatible with the silica matrix.

Abstract: In this study, the electroactive hybrid gels with controllable sol-gel process were fabricated based on the water soluble polyaniline complex and water soluble silica precursor. β-cyclodextrin grafted on chitosan (CSCD) acted as a template, a new route for the synthesis of water soluble polyaniline complex (PA@CSCD) was designed by in-situ polymerization. Then, the hybrid silica gels without severe shrinkage were prepared by mixing PA@CSCD complex with water soluble precursor (tetrakis(2-hydroxyethyl)orthosilicates, THEOS). By dynamic rheological measurements, it was found that PA@CSCD complex could trigger and accelerate the sol-gel transition of the silica precursor. The gelation time could be largely shortened with the increase of PA@CSCD complex amount. By SEM observation, the PA@CSCD complex could be well compatible with the silica matrix. Moreover, the hybrid gels showed the good redox electroactivity, which could be successfully applied in a HRP-based biosensor.

Keywords: polyaniline; chitosan derivatives; hybrid gels; controllable sol-gel transition; electroactivity.

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