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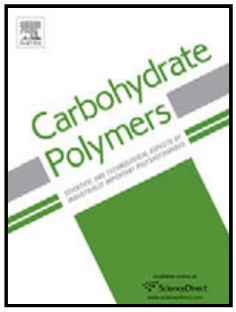

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Synthesis, Characterization, and Controlled Release of Selenium Nanoparticles Stabilized by Chitosan of Different Molecular Weights

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Abstract:

Chitosan-stabilized selenium nanoparticles (SeNPs) have been reported, but there is no information on the effect of the chitosan molecular weight on the structure, stability, and selenium release properties of the SeNPs. Herein, we compared the uniform Se^0 spherical nanoparticles prepared through the reduction of seleninic acid with ascorbic acid in the presence of chitosan with different molecular weights (Mws). We found that both low and high molecular weight chitosan-stabilized selenium nanoparticles exhibited core-shell microstructures with a size of about 103 nm after 30 days growing through the "bottom-up approach" and "top-down approach," respectively. Moreover, both chitosan SeNPs processed excellent stability towards pH and enzyme treatment. In contrast, selenium was easily released to different extents from these two chitosan SeNPs upon treatment with different free radicals. This makes these materials potentially useful as oral antioxidant supplements.

Keywords: Selenium; Chitosan; Molecular weight; Controlled release; Free radicals

Highlights:

- Selenium nanoparticles were stabilized by chitosan of different Mws with different mechanisms.
- The morphology of chitosan SeNPs was independent of its Mw after 30 days of growth.
- Both chitosan SeNPs showed great stability toward pH changes and enzyme treatment.

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