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Synthesis of Varisized Chitosan-Selenium Nanocomposites through Heating Treatment and Evaluation of Their Antioxidant Properties

Wanwen Chen, Lin Yue^{*}, Qixing Jiang, Xiaoli Liu, Wenshui Xia^{*}

State Key Laboratory of Food Science and Technology, School of Food Science and Technology, Collaborative Innovation Center of Food Safety and Quality Control in Jiangsu Province, of Jiangnan University, Lihu Road 1800, Wuxi, 214122 Jiangsu, People's Republic of China

Abstract: We reported an innovative approach to the synthesis of varisized chitosan-selenium (CS-Se) nanocomposites, which for the first time used CS both as a reductant and stabilizer to synthesize CS-Se nanocomposites. By manipulating the temperature, the well-dispersed CS-Se nanocomposites were synthesized via a simple one pot reaction with the size ranging from 83 to 208 nm before being characterized by TEM, DLS, UV-vis, FTIR, XRD and TG analyses. The results showed that SeO_3^{2-} was reduced to a stable SeNPs colloid at a comparatively high temperature and the amino group and part of hydroxyl group of CS were conjugated to the surface of SeNPs. Besides, DPPH, ABTS⁺, hydroxyl radical, metal ion chelating and reducing power assays were carried out to investigate the antioxidant activities of CS-Se nanocomposites, which proved to be concentration-dependent, size-dependent and exhibited good antioxidant activity. The results suggested that CS-Se nanocomposites might be considered as a more appropriate selenium-adding form to achieve antioxidative goals in food.

Keywords: CS-Se nanocomposites; Reaction Temperature; Antioxidant

^{*} Corresponding author: xiaws@jiangnan.edu.cn; yuelin@jiangnan.edu.cn.

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