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Measurement of Zeta Potential of Polysaccharides and Fabricating Polysaccharide-polysaccharide Nanotubes

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ABSTRACT

Biopolymer nanotubes (BNTs) are two-open ended cylindrical structures which can be used for nanodevices, medicine, and biology. Especially, fabricating BNTs using proteins is suitable for biological and biomedical applications due to their safety and biocompatibility. This study has been focused on fabricating BNTs using polysaccharides which have been proved to be safe by the FDA and used in food applications. The zeta-potential, surface charge, of different polysaccharides was measured to find the region of stability and isoelectric point from pH 4 to 11 by DLS. Next, xanthan and chitosan have been selected for fabricating BNTs because of their stability and dispersibility compared to the other polysaccharides. Two polysaccharide solutions were adjusted to pH 4 where the charge difference was the largest; and BNTs were fabricated at different mass ratio using a template assisted layer-by-layer method. Then, SEM images were taken to visualize the nanotubes. As a result, some nanotubes were seen in the SEM images; however, they did not have the optimal well defined form yet. Also, there were too many clusters instead of individual clear nanotubes. The interaction and the size of the proteins might be too large, so the polysaccharides tended to form globular structures instead of nanotubes. To fabricate BNTs, xanthan will be hydrolyzed to reduce size, and the mass ratio would be also reduced to decrease the interaction between two polysaccharides.

KEYWORDS

Biopolymer nanotubes, polysaccharides, xanthan, chitosan, DLS.

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