

Hemocompatibility and cytocompatibility of pristine and plasma-treated silver-zeolite-chitosan composites

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Abstract

Silver-exchanged zeolite-chitosan (AgZ-Ch) composites with varying AgZ content were prepared by solvent casting and modified under argon (Ar) plasma excited by a 13.56 MHz radio frequency (RF) power source. Silver (Ag) was successfully incorporated in a natural zeolite host without losing its antimicrobial activity against *E. coli* and *S. aureus*. The AgZ particles were incorporated into a chitosan matrix without making significant changes in the matrix structure. The composites also exhibited antibacterial sensitivity due to the inclusion of AgZ. Plasma treatment enhanced the surface wettability of polar and nonpolar test liquids of the composites. The average increase in total surface free energy after treatment was around 49% with the polar component having a significant change. Cytocompatibility tests showed at least 87% cell viability for pristine and plasma-treated composites comparable with supplemented RPMI as positive control. Hemocompatibility tests revealed that pristine composites do not promote hemolysis and the blood clotting ability is less than 10 mins. Coupled with the antibacterial property of the composites, the fabricated composites have promising biomedical applications.

Keywords: zeolite, chitosan, silver, composites, plasma treatment

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