

Charged Metallopolymer-Grafted Nanoparticles for Antimicrobial Applications

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Abstract: Over-prescription and improper use of antibiotics has led to the emergence of bacterial resistance and now poses a major threat to public health. There has been significant interest in the development of alternative therapies and agents to combat antibiotic resistance. We report the preparation of various nanoparticles grafted with charged cobaltocenium-containing metallopolymers by surface-initiated reversible addition-fragmentation chain transfer (RAFT) polymerization. β -Lactam antibiotics were then conjugated with metallopolymers to enhance their vitality against both Gram-positive and Gram-negative bacteria. The enhanced antibacterial activity was a result of synergy of antimicrobial segments that facilitate the inhibition of hydrolysis of antibiotics and local enhancement of antibiotic concentration on a nanoparticle surface. Studies suggested negligible toxicity of metallopolymer-grafted nanoparticles to red blood cells and minimal tendency to induce resistance in bacteria.