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Green synthesis of antimicrobial and antitumor *N,N,N*-trimethyl chitosan chloride/poly (acrylic acid)/silver nanocomposites

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Abstract

The present study is imported to solve two critical problems we face in our daily life which are microbial pollution and colon cancer. One pot green synthesis of a water soluble polyelectrolyte complex (PEC) between cationic polysaccharide as *N,N,N*-trimethyl chitosan chloride (TMC) and anionic polymer as poly (acrylic acid) (PAA) in presence of silver nanoparticles to yield (TMC/PAA/Ag) nanocomposites with different Ag weight ratios. Structure of TMC, PAA and TMC/PAA (PEC) were proved via different analysis tools. TMC/PAA and its Ag nanocomposites are used as antimicrobial agents against different pathogenic bacteria and fungi to solve microbial pollution. TMC/PAA-Silver nanocomposites had the highest antimicrobial activity which increases with increasing Ag %. Cytotoxicity data confirmed also that TMC/PAA/Ag (3%) had the most cytotoxic effect (the less cell viability %) towards colon cancer. TMC/PAA (PEC) was formed through electrostatic interactions between *N*-quaternized ($-N^+R_3$) groups in TMC and carboxylate ($-COO^-$) groups in PAA.

Keywords

N,N,N-trimethyl chitosan chloride; Poly(acrylic acid); Polyelectrolyte complex; Nanocomposites; Antimicrobial activity.

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