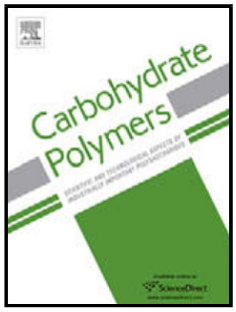

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Poly(quaternary ammonium salt-epoxy) Grafted onto Ce Doped ZnO Composite: An Enhanced and Durable Antibacterial Agent

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Highlights:

1. The P(DMDAAC-AGE)/(Ce-ZnO) composite was synthesized by the polymer including quaternary ammonium salt and epoxy groups grafting onto the surface of Ce-ZnO nanorods.
2. The synergistic action between Ce-ZnO and quaternary ammonium salt endowed fabrics with an excellent and broad-spectrum antibacterial activity.
3. The epoxy groups from the P(DMDAAC-AGE)/(Ce-ZnO) composites reacted with the hydroxyl groups of cotton fibers to form chemical covalent bonds, which bestowed the fabrics with an excellent and durable antimicrobial activity.

Abstract:

The composite after referred to as P(DMDAAC-AGE)/(Ce-ZnO) was prepared via free radical polymerization by polymer including quaternary ammonium salt and epoxy group which grafted onto the surface of Ce-ZnO. ZnO nanorods, Ce-ZnO nanorods, P(DMDAAC-AGE), P(DMDAAC-AGE)/ZnO composites, P(DMDAAC-AGE)/(Ce-ZnO) composites and commercial antimicrobials were respectively treated on the cotton fabrics and their biological properties were investigated. There is a synergistic effect between Ce-ZnO and N^+ from the polymer in the fabric treated with P(DMDAAC-AGE)/(Ce-ZnO) composite so that it had a better antibacterial activity than pure polymer and pure Ce-ZnO. The antimicrobial rate of fabric treated with P(DMDAAC-AGE)/(Ce-ZnO) composite could reach up to 96%. And in order to investigate the durable ability, the fabric was washed multiple times to simulate the daily use washing. The result showed that the fabric still