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## Chitosan oligosaccharide-N-chlorokojic acid mannich base polymer as a potential antibacterial material

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### Highlights

- Novel nontoxic antibacterial material COS-N-MB was synthesized by alkylation reaction.
- COS-N-MB showed enhanced antibacterial activity against bacteria.
- The action mode of COS-N-MB on bacteria was clarified.
- COS-N-MB showed good biocompatibility, noncytotoxic and low hemolysis.
- COS-N-MB has potential in food industry and biomedical sciences.

**Abstract:** Here, a nontoxic antibacterial material based on Chitosan Oligosaccharide-N-Chlorokojic acid Mannich base (COS-N-MB) that was synthesized by using the selective partial alkylation reaction displaying excellent activity against bacterial infection. The proposed mechanism of the action of COS-N-MB is that this antibacterial material with positive charge and synergistic antibacterial effects can promote its adsorption to bacterial cell wall through electrostatic interaction and chelating metal cations. It changed the permeability of the membrane, caused cellular leakage, and destroyed the membrane integrity, leading to complete membrane disruption and eventually death of the bacteria. Besides, COS-N-MB can interact with membrane proteins, causing deformation in the structure and functionality. The good biocompatibility, noncytotoxic, and low hemolysis made this novel material a promising and effective compound for antibacterial applications.

**Keywords:** Chitosan oligosaccharide; Kojic Acid; Mannich reaction; Antibacterial material

### Chemical compounds studied in this article:

Chitosan oligosaccharide (PubChem CID: 3086191); Kojic acid (PubChem CID: 3840);

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