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Antibacterial activity of PLAL synthesized nanocinnamon

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Highlights

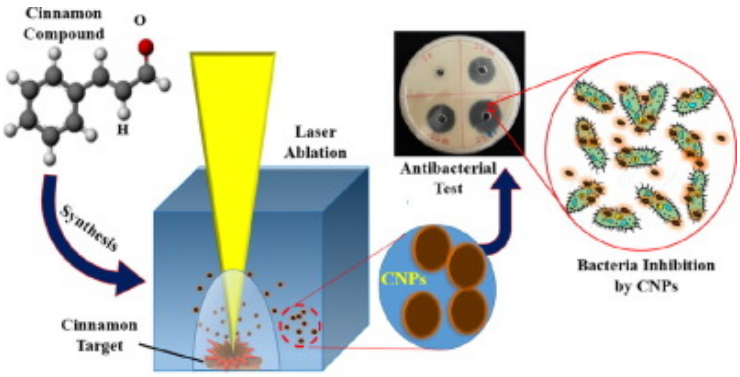
- Highly crystalline cinnamon nanoparticles (CNPs) were prepared via PLAL method in methanol.
- The morphology of CNPs was controlled by varying the laser ablation energy.
- Effects of varying laser ablation energies on the properties of CNPs were examined.
- Elliptical CNPs displayed strong antibacterial activity against various bacterial strains.

Abstract

Natural cinnamon containing polyphenolic compound is well known for diverse biological activities, broad range of pharmacological and therapeutic properties. However, the potential of nanocinnamon for antibacterial usage was not widely explored. Highly crystalline elliptical shaped cinnamon nanoparticles (CNPs) were prepared via pulse laser ablation in liquid (PLAL) by immersing a cinnamon target in methanol. Effects of varying laser fluence on the structure, morphology and optical properties of as-grown CNPs were determined. Samples were characterized via UV-Vis, FTIR, XRD, TEM, HRTEM, SAED, EDX, DLS and HPLC measurements. Methanol was found to be favorable for the growth of CNPs at optimum fluence of 5.73 J/cm^2. These CNPs revealed robust antibacterial activity against Gram-negative and Gram-positive bacterial strains including *Escherichia coli, Pseudomonas aeruginosa, Bacillus subtilis* and *Staphylococcus aureus*. Antibacterial activity of CNPs was evaluated via agar well diffusion assay and optical density (OD_{600})

tests. It was established that the PLAL may constitute a basis for the production CNPs with desired size distribution potential for nanomedicinal applications.

Graphical abstract



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Keywords

Nanocinnamon; Laser ablation; Structure; Morphology; Antibacterial activity

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