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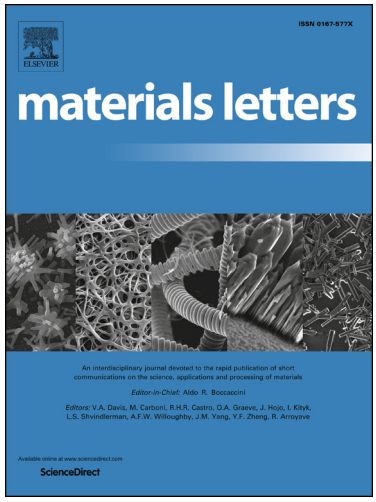

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Antibacterial and Antibiofilm Activity of Barium Titanate Nanoparticles

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Abstract

In this research work barium titanate nanoparticles ($BaTiO_3$ NPs) were prepared by co-precipitation method using barium nitrate and titanium dioxide precursors. The structural and morphological studies of the NPs were carried out by X-ray diffraction (XRD), Fourier transform infrared spectroscopy (FTIR), Scanning electron microscopy (SEM) and Transmission electron microscopy (TEM). The XRD pattern confirmed the formation of the $BaTiO_3$ NPs having average size less than 100 nm. $BaTiO_3$ NPs were also evaluated for their efficacy against the human pathogenic bacteria. Significant antimicrobial and antibiofilm activities of $BaTiO_3$ NPs were observed against *P. aeruginosa* and *S. aureus* clinical isolates. Results presented in this work confirm that $BaTiO_3$ NPs can control the growth of biofilm formation activities of pathogenic bacteria at very low concentration and hence suggests their use as alternative antimicrobial agents. This is the first report on chemical method synthesized $BaTiO_3$ NPs for its biofilm inhibition activity.

Key Words: Nanoparticles, FTIR, Electron Microscopy, Biofilm

1.0 Introduction

Nanotechnology is the manipulation of matter at the atomic, molecular and nanoscale. The properties offered by the materials at the nanoscale are very different from those offered by materials at a larger scale. Thus nanotechnology provides the opportunity to improve the qualities and properties of materials, electronic devices, biological systems etc. $BaTiO_3$ belongs to the family of perovskites and shows high dielectric constant and low loss characteristics making it useful in applications like capacitors, transducers and multilayer capacitors (MLCs)