

Biosynthesis of Titanium Dioxide Nanoparticles and Their Antibacterial Property

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Abstract : This paper presents a low-cost, eco-friendly and reproducible microbe mediated biosynthesis of TiO_2 nanoparticles. TiO_2 nanoparticles synthesized using the bacterium, *Bacillus subtilis*, from titanium as a precursor, were confirmed by TEM analysis. The morphological characteristics state spherical shape, with the size of individual or aggregate nanoparticles, around 30-40 nm. Microbial resistance represents a challenge for the scientific community to develop new bioactive compounds. Here, the antibacterial effect of TiO_2 nanoparticles on *Escherichia coli* was investigated, which was confirmed by CFU (Colony-forming unit). Further, growth curve study of *E. coli* Hb101 in the presence and absence of TiO_2 nanoparticles was done. Optical density decrease was observed with the increase in the concentration of TiO_2 . It could be attributed to the inactivation of cellular enzymes and DNA by binding to electron-donating groups such as carboxylates, amides, indoles, hydroxyls, thiols, etc. which cause little pores in bacterial cell walls, leading to increased permeability and cell death. This justifies that TiO_2 nanoparticles have efficient antibacterial effect and have potential to be used as an antibacterial agent for different purposes.

Keywords : antibacterial effect, CFU, *Escherichia coli* Hb101, growth curve, TEM, TiO_2 nanoparticle, Toxicity, UV-Vis

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