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(57) Abstract :
[037] The present invention discloses a green, sustainable method for synthesizing titanium dioxide (TiO_2) nanoparticles using orange peel extract as a natural reducing and stabilizing agent. The method involves preparing an aqueous extract of orange peel and combining it with a titanium tetraisopropoxide solution under ambient stirring and neutral pH conditions. The resulting nanoparticles are filtered, dried, and calcined to yield anatase-phase TiO_2 with particle sizes ranging from 12 to 19 nanometers. Characterization using XRD, FTIR, UV-Vis, and FESEM-EDX confirms the crystalline structure, purity, and biofunctional surface chemistry of the nanoparticles. The biosynthesized TiO_2 exhibits significant antimicrobial activity against a range of bacterial and fungal pathogens, making it suitable for applications in biomedical coatings, environmental purification, and antimicrobial formulations. This invention offers a low-cost, eco-friendly alternative to conventional synthesis methods while promoting waste valorization and green nanotechnology. Accompanied Drawing [FIGS. 1-2]

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