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NANOSTRUCTURED TIO₂ AND TIO₂-CU THIN FILMS SYNTHESIZED BY COST EFFECTIVE SOL-GEL PROCESS FOR ANTIMICROBIAL APPLICATIONS

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Bacterial infection is one of the common clinical problems which can be prevented by coating the surgical instruments or implants with antibacterial properties. The high incidence of infections caused by either fungal or bacteria on the surface of implanted biomedical devices and environment in the hospital has a severe impact on patient's health. However no detailed investigations have been reported on active species of fungal and bacteria. In this present investigation, we have systematically studied the antifungal (against Candida albicans (MTCC-1637), Candida tropicalis (MTCC-184), Candida parapsilosis (MTCC-2509), Candida glabrata (MTCC 3019) and antibacterial properties of 4 species namely (against Staphylococcus faecalis (NCIM-2604). Staphylococcus epidermidis (NCIM-2493), Staphylococcus aureus (NCIL-2122), Bacillus subtilis (NCIM-2549) each using pure TiO₂ and TiO₂ with Cu (with different doping concentrations) as an additive by using simple and cost effective sol-gel process. The films have been deposited on glass and Si substrates and their structural, morphological properties have been investigated by employing standard techniques such as Scanning Electron Microscopy, Profilometer, X-ray photoelectron spectroscopy, respectively. The antifungal and antibacterial property has been carried out by using drop test method. It is evident from the results that with increasing Cu concentration the antimicrobial activity increases and no colony formation is observed after 4 h.