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A simple in *vitro* method for the detection of antimicrobial activity of titanium dioxide coated materials against *Escherichia coli* and *Staphylococcus aureus*

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The photo catalytic sterilization properties of titanium dioxide (TiO_2) againstviruses, bacteria and algaehave been reported. TiO_2 is therefore used as a self-cleaning and self-sterilizing material. The objective of this study was to quantify the antimicrobial activity of TiO_2 treated materials against *E. coli* and *S. aureus* using an *in vitro* method. In contrast to other methods such as OD based % survival rate, scanning electron microscope preparations, the surviving individual colony forming units (cfu) on a specified solid media were measured.

TiO_2 coated materials were prepared in the Industrial Technology Institute (ITI) laboratory. *E. coli* and *S. aureus* cultures grown in nutrient broth, at 35 ºC, were seeded (10^4 CFU/ml) on to the TiO_2 coated material surface (3 cm x 7.3 cm) and spread aseptically. Control ceramic material without TiO_2 coating was seeded in the same manner. Both test and control ceramic materials were placed in a weatherometer, with UV source (300 – 800 nm), for 40 min. Thereafter, both test and control samples were placed inverted on solidified specific agar plates for 5 min. After exposure, the materials were withdrawn from the agar surface aseptically, and incubated at 35 ^{0}C, for 24 h. Growth on the plates was visibly observed. For quantification, both test and control materials were prepared and subjected to the weatherometer, as described. After 40 min, the samples of test and control materials were swabbed aseptically and transferred in to the nutrient broth (10 ml). Serial dilutions were prepared with diluents and from each serial dilution prepared, 10 and 100 µL were pipetted on to sterilized petri plates. To the plates containing *E.coli* and *S.aureus*, Mackonkey Agar and Blood Agar were poured, respectively. Solidified plates were incubated at 35 ^{0}C, for 19 h. Colonies were counted and the antibacterial assessment was repeated three times.

TiO_2 coated material showed higher antibacterial activity against *E.coli* (0.2×10^1) than against *S. aureus* (0.3×10^1). This method could be successfully used in routine laboratory analysis for quantification of antimicrobial activity of TiO_2 coated materials such as granite, steel surfaces, ceramic tiles and wood surfaces. A limitation of this method is that the surface of the test material should be smooth for swabbing.

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