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Prototype Development and Testing for Antimicrobial Analysis of Silica-Titanium Hydrogen Peroxide Oxidative Matrix †

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Abstract: Airborne contagious diseases have hindered and deemed the usage of appliances and systems involved in frequent air supply or distribution. All living cells are susceptible to varying degrees of oxidative stress which tears down their molecular integrity by degrading lipids, proteins, nucleic acids, and other biomolecules essential for sustaining and propagating life. The silica- titanium sol-gel matrix was observed by scientists to chemisorb hydrogen peroxide, and hydroxide free radicals in association with titanium make up the matrix's peripheral surface indicating the matrix's oxidative capacity. This can be an effective shield or filter against airborne microorganisms. The prototype has individual units that function to regulate and control the air temperature, humidity, and flow velocities so that the antimicrobial analysis of the matrix used could be tested at different process conditions similar to the conditions in air conditioners. Antimicrobial analysis of the matrix will be tested against *Mycobacterium smegmatis,* which will act as a surrogate for *Mycobacterium tuberculosis* and other common air bacterial species of *Staphylococcus, Pseudomonas, Bacillus,* and *micrococcus* genera's available. The antimicrobial efficiency of the matrix is determined through calculations based on colonies formed in culture mediums placed at separate regions within the prototype.

Keywords: oxidative stress; silica titanium sol-gel matrix; hydroxyl free radical; mycobacterium smegmatis.

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Conflicts of Interest

The authors declare no conflict of interest.