Rapid Assessment of Biological Activity of Ag-Based Antiviral Coatings for the Treatment of Textile Fabrics Used in Protective Equipment Against Coronavirus

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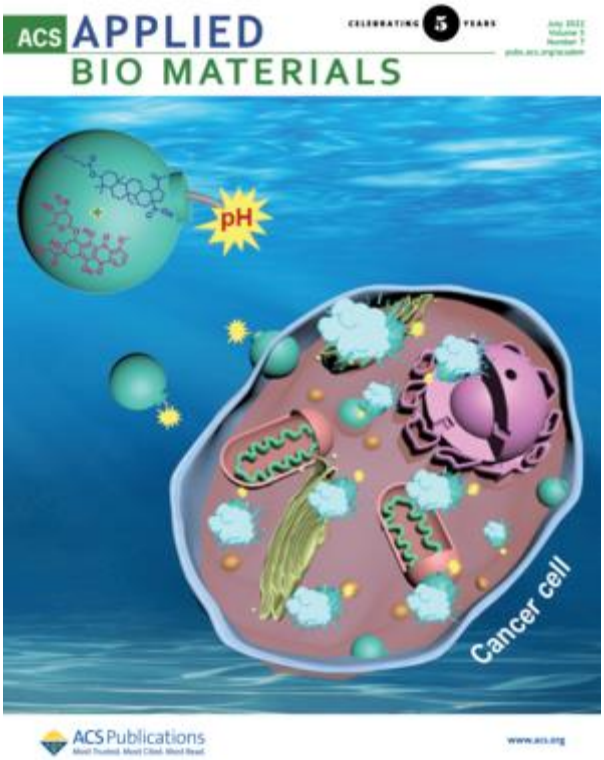

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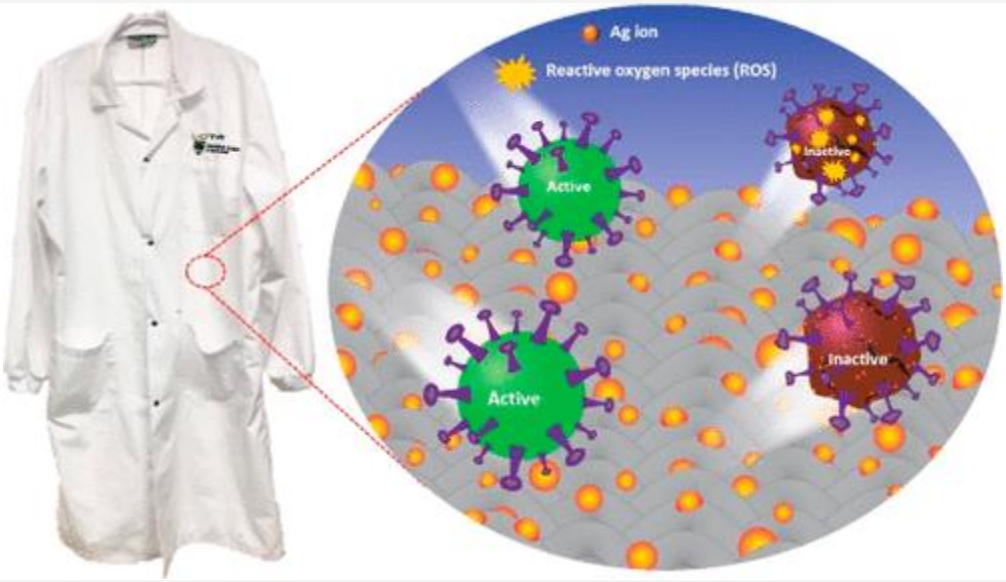
Abstract



Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and its variants have rapidly spread worldwide, causing coronavirus disease (COVID-19) with numerous infected cases and millions of deaths. Therefore, developing approaches to fight against COVID-19 is currently the most priority goal of the scientific community. As a sustainable solution to stop the spread of the virus, a green dip-coating method is utilized in the current work to prepare antiviral Ag-based coatings to treat cotton and synthetic fabrics, which are the base materials used in personal protective equipment such as gloves and gowns. Characterization results indicate the successful deposition of silver (Ag) and stabilizers on the cotton and polypropylene fiber surface, forming Ag coatings. The deposition of Ag and stabilizers on cotton and etched polypropylene (EPP) fabrics is dissimilar due to fiber surface behavior. The obtained results of biological tests reveal the excellent antibacterial property of treated fabrics with large zones of bacterial inhibition. Importantly, these treated fabrics exhibit an exceptional antiviral activity toward human coronavirus OC43 (hCoV-OC43), whose infection could be eliminated up to 99.8% when it was brought in contact with these fabrics after only a few tens of minutes. Moreover, the biological activity of treated fabrics is well maintained after a long period of up to 40 days of post-treatment.