

Antimicrobial/virucidal composite coatings via co-sputtering technique

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Emerging and re-emerging bug/virus-related diseases represent a threat for human safety. Two years of pandemic caused a global health emergency, with over 460 million of confirmed cases and about 6 million deaths, and a drastic economic crisis. Despite vaccines and the strict confinement measures, the disease continues affecting the whole community, also through the virus variants.

Antimicrobial/virucidal composite coatings, via co-sputtering technique, were developed and patented [1]. Co-sputtering is a well-known coating deposition technique, industrially scalable, versatile and green which needs only gases and bulk starting materials without requiring or producing dangerous liquid materials.

The thin nanostructured coatings (less than 200 nm) are composed of silver nanoclusters embedded into glass/ceramic matrix and deposited on different surfaces, including air filters and textiles, without affecting the main properties of the substrates, such as flexibility, porosity, permeability and mechanical characteristics. Figure 1 reports a schematic representation of the co-sputtering technique and the so-obtained composite coating.

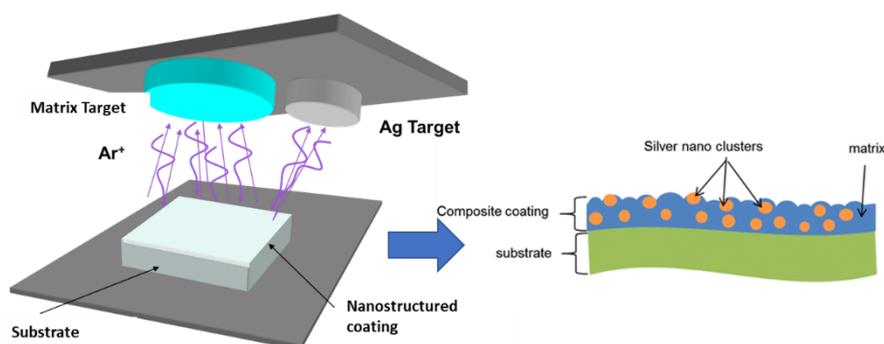


Figure 1. Schematic representation of co-sputtering technique and the composite coating

The nanoclusters are not dispersed into the surrounding environment or in human skin, instead they show a gradual release of metallic ions. Antibacterial/fungal tests confirmed silver effect to prevent adhesion and proliferation of several bacterial strains and fungi. The nanostructured coatings developed a significant virucidal activity against several viruses as respiratory

syncytial virus, the influenza virus type A, human rotavirus type WA and human coronavirus (OC43), including SARS-COV-2, responsible of the current pandemic [2, 3].

[1] Ferraris M., Balagna C. and Perero S., PCT//IIB2018//057639 - WO2019/082001 (2019)

[2] Balagna C., Perero S., Percivalle E., Nepita E.V. and Ferraris M, *Open Ceramics*, 1 (2020) 100006.

[3] Balagna C., Francese R., Perero S., Lembo D. and Ferraris M, *Surface & Coatings Technology*, 409 (2021) 126873.