

Supplementary Materials: Physicochemical and Morphological Properties of Hybrid Films Containing Silver-Based Silica Materials Deposited on Glass Substrates

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Antimicrobial Activity

Activity testing was performed by the diffusion method through spot inoculation. Bacterial and fungal strains (*Staphylococcus aureus* (*S. aureus*) and *Candida albicans* (*C. albicans*)), purchased from German Collection of Microorganisms and Cell Cultures (DSMZ) (Braunschweig, Germany), were used in this experiment. From the microbial strains was prepared a working inoculum, a microbial suspension in A.F.S., made from a young culture of about 15–18 h, developed on a solid medium. Inoculum turbidity was adjusted nephelometrically (McFarland standard 0.5 = 1.5×10^8 UFC/mL). The plates were inoculated with the microbial suspension, using a sterile swab by spreading. 10 μ L from each of the 2 samples were poured onto the culture media surface by spot inoculating. After 24 h, the antimicrobial effect was evaluated by measuring the diameters of the growth inhibition zones.

To test the antimicrobial activity of the hybrid films, the pieces of films (1.5 $\times$ 1.5 cm²) were arranged on each inoculated plate with a sterile forceps. The samples were tested in duplicate. The inoculated plates were incubated at 37 °C for 24 h in the case of the *Staphylococcus aureus* strain and at 28 °C for 24 h in the case of the *Candida albicans* strain, respectively.

Microscopic images at the contact area between the hybrid films (glasses coated with silica material and with silver-based silica material) and the bacterial and fungal strains (*S. aureus* and *C. Albicans*) were performed using an optical microscope (Microscope Olympus BX51 Color View, Tokyo, Japan).

Antibiograms were carried out using the diffusion method through spot inoculation (Figure S1). The inhibitory effect of obtained samples on bacterial and fungal strains was determined by measuring the diameter of the inhibition zone, after 24 h (see Table S1).

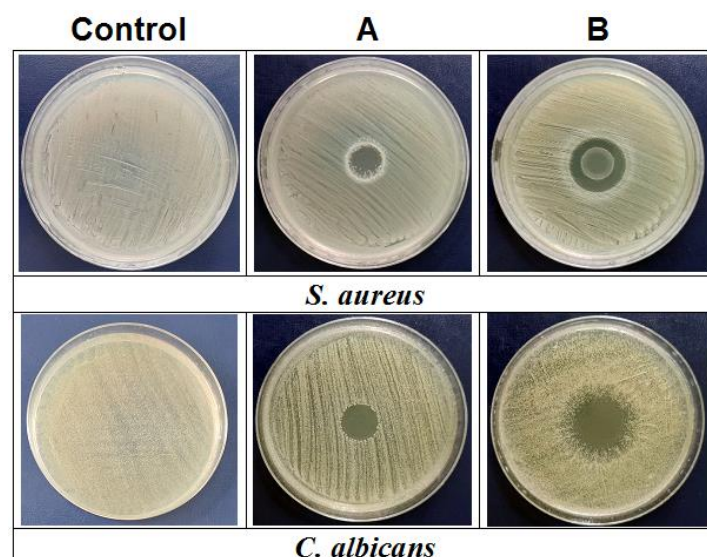


Figure S1. Antimicrobial activity of silica material (sample A) and of silver-silica material (sample B), against *S. aureus* and *C. albicans*.

Table S1. Diameter of inhibition zone obtained by the diffusion method through spot inoculation for the silica material (sample A) and the silver- silica material (sample B), against *S. aureus* and *C. albicans*.

Microbial Strain	Diameter of Inhibition Zone (mm)	
	Silica Material (A)	Silver-Silica Material (B)
<i>S. aureus</i>	16.5	18
<i>C. albicans</i>	17	20

As observed in Figure S1 and Table S1, both samples exhibit antimicrobial activity against fungal and bacterial strains. The prepared samples in our study have hollows of 16.5 mm and of 18 mm, respectively, against *S. aureus* and have hollows of 17 mm and of 20 mm, respectively, against *C. albicans*.

It was demonstrated that the alkyl group could absorb a larger amount of Ag^+ ions due to the complex and electrostatic interactions between Ag^+ ions and alkyl functional groups.