ATMOSPHERIC-PRESSURE PLASMA SPRAY DEPOSITION OF SILVER/HMDSO NANOCOMPOSITE ON POLYAMIDE 6,6 WITH CONTROLLABLE ANTIBACTERIAL ACTIVITY

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Medical textiles are used in a range of applications from bandages, dressings, suture and surgical clothing to implants such as scaffolds, stents and meshes.[1] Infections associated with these devices are responsible for at least 2-7% of post-operational complications increasing mortality and healthcare costs.[2] Conventional antibacterial coatings by wet chemistry, low-pressure plasma and sputtering have several drawbacks but the most important is their uncontrollable antibacterial activity.[3] The main objective of this work was to produce, by dielectric barrier discharge (DBD) plasma-assisted deposition at atmospheric pressure a new generation of coatings containing silver nanoparticles (AgNPs) with strong bonding and controllable antibacterial activity on medical textiles.[4] Ag ions release was tune using a "sandwich" coating structure where a 1st antibacterial nanocomposite layer is covered by a thick 2nd layer of hexamethyldisiloxane (HMDSO) in order to prolong antibacterial effect.[5] Moreover, the novel spray-assisted deposition drastically increase deposition rates at atmospheric pressure.[6] The result shows an increase AgNPs deposition in plasma treated samples (Fig. 1) and antimicrobial activity for the sample with additional HMDSO outlayer (Table 1).

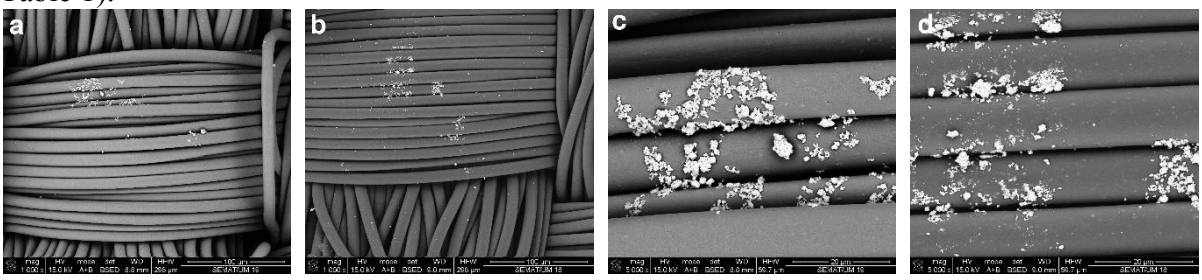

Figure 1. SEM micrograph at magnifications of x1000 and 5000 of untreated (a, c) and plasma treated (b, d) polyamide 6,6 fabric.

Table 1. Antimicrobial activity in *S. aureus* and *E. coli* with different HMDSO coatings layers

Spray methods	*S.aureus*		*E.coli*	
	Untreated	Plasma	Untreated	Plasma
AgNPs + HMDSO	0	0	0	0
(HMDSO/AgNPs)	0	0	0	0
(HMDSO/AgNPs) +	0	2.6 ± 1.2	0	0
HMDSO + AgNPs +	0	1.8 ± 0.2	0	0

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