Silver Nanostar-based Biocide Surfaces

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Nosocomial infections are a major concern given the current multiple resistance to antibiotics developed by the involved bacteria. Bacterial pathogens can grow in surfaces and eventually form biofilms, that adds an extra layer of complexity to fight their proliferation. [1] This way, inhibiting the proliferation of such microorganisms on surfaces is the first step for material's safety. The effect of silver ions (Ag^+) as a bactericidal agent is well known [2], so in this work we used silver nanoparticles as a "reservoir" of Ag^+, in the form of silver atoms (Ag^0) that comprise the nanoparticles and, when oxidized, can leave the particle as Ag^+. In this work, we covered 0.13-0.16 mm thick, 9 mm diameter glass disks with silver nanostars (AgNSs) using a deposition by centrifugation method [3]. The silver nanostars were synthesized as described elsewhere [4], with modifications. The resultant silver nanostars presented a 186 nm mean hydrodynamic diameter (distribution in number, determined by nanoparticle tracking analysis). After the deposition of the AgNSs, the surfaces were characterized by scanning electron microscopy, showing a homogeneous distribution of AgNSs across the surface. The proliferation of two bacterial species – *P. aeruginosa* ATCC 27853 and *S. aureus* ATCC 25923 – was accessed by several methods, including LIVE/DEAD cell viability staining assays, by fluorescence confocal microscopy. In figure 1, it is possible to see, for *S. aureus* ATCC 25923, viable microorganisms on top of a non-coated surface (stained as green, left), whereas for the AgNSs-coated most of the bacteria were non-viable (stained as red, right). The AgNSs described in this work showed a good potential as a surface coating with biocide effects.

REFERENCES

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FIGURES

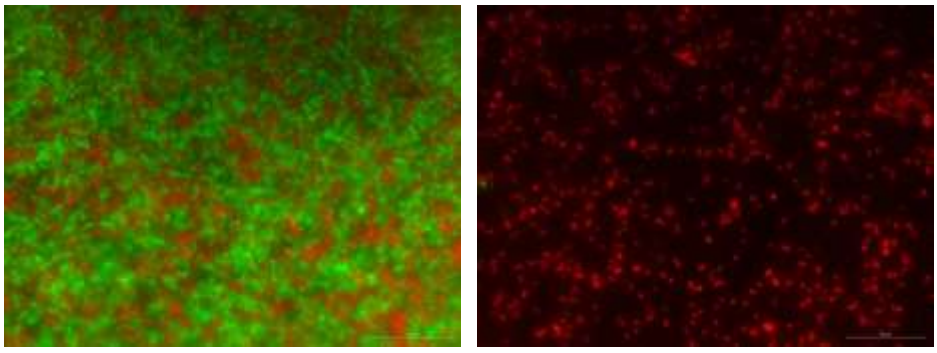

Figure 1: LIVE/DEAD staining micrographs of *S. aureus* ATCC 25923 deposited on non-coated (left) and AgNSs-coated (right) surfaces, after 24 h.

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