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Antibacterial Silver-containing DLC and ta-C coatings: A Comparative Study
(Symposium D: Biosurfaces and Biointerfaces)

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Hydrogenated diamond-like carbon (DLC) and (hydrogen-free) tetrahedral amorphous carbon (ta-C) coatings are known to be biocompatible and chemically inert. For these reasons, both of these materials are strong candidates to be used as a matrix that embeds metallic elements with antimicrobial effect. In this comparative study, we have incorporated silver into hydrogenated DLC coatings, obtaining DLC:Ag, synthesized by plasma based ion implantation using methane (CH₄) plasma, while simultaneously depositing silver from a pulsed cathodic arc source. In addition, we have grown tetrahedral amorphous carbon – silver composite coatings, ta-C:Ag, using a dual-cathode pulsed cathodic-arc source. The silver atomic content of the deposited samples was analyzed using glow discharge optical spectroscopy (GDOES). For both DLC:Ag and ta-C:Ag coatings, the pulse frequency of the silver cathodic arc was adjusted in order to obtain samples with approximately equal silver content. The deposited films were characterized by X-ray diffraction and Raman spectroscopy. The bactericidal efficacy against cytotoxicity was evaluated for both DLC:Ag and ta-C:Ag samples deposited on 24-well tissue culture plates.