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Double layered nanostructured composite coatings for biomimetic implant applications

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We report on the transfer of double layered bioactive glass/polymer composites by matrix assisted pulsed laser evaporation to uniform thin layers onto stainless steel implant. The deposition was made in two steps and the influence of the deposition process on nanomaterials structures was studied. Cryogenic targets containing PMMA (first) and antimicrobial natural extract reinforced with bioglass powders (second) were submitted to multipulse ablation with an UV KrF* (λ=248 nm, t~25 ns) excimer laser source. The main advantages with these nanostructures are multiple: stopping any leakage of metal and metal oxides to the biological fluids and finally to inner organs (by polymer use), speeding up osteointegration (by bioactive glass use), antimicrobial effect (by natural antibiotics use) and decreasing of the implant price (by cheaper stainless steel use). The behaviour of bioactive glass/polymer/stainless steel structure in condition which simulates the physiological environment was evaluated invitro by complementary techniques. The bioactivity and the release of the antibiotic were assessed by immersion into simulated body fluid and monitoring by FTIR and UV-VIS spectrometry and electrochemical measurements involving corrosion and EIS studies were carried out in order to investigate the corrosion resistance. The biological properties were tested including the microbial viability using Gram-and Gram+bacterial strains, the microbial adherence and the cytotoxicity on eukariotic cells.

Biography

Laura Floroian has received her BSc Degree in Physics at University of Bucharest, Romania. She is currently working as Associate Professor at Transilvania University of Brasov, Romania. Her current research interests cover biomaterials fields, optical sensor for cell detection, biosensors for biological compounds and toxic compounds, advanced techniques for thin films deposition and advanced techniques for surface characterization. She is a member of many scientific societies: SRF-Romanian Society of Physics, Romanian Society of Automation and Technical Informatics (SRAIT), National Society for Medical Engineering and Biological Technology (SNMITB) and International Association of Online Engineering (IAOE).

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