Microplasma synthesis of biocompatible coatings with additions of magnesium, silicon and silver on pure titanium from homogeneous electrolytes

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PII: S0257-8972(16)30429-7
DOI: doi: 10.1016/j.surfcoat.2016.05.045
Reference: SCT 21200

To appear in: *Surface & Coatings Technology*

Received date: 8 February 2016
Revised date: 12 May 2016
Accepted date: 17 May 2016

Please cite this article as: O.P. Terleeva, A.I. Slonova, I.V. Mironov, A.B. Rogov, Yu.P. Sharkeev, Microplasma synthesis of biocompatible coatings with additions of magnesium, silicon and silver on pure titanium from homogeneous electrolytes, *Surface & Coatings Technology* (2016), doi: 10.1016/j.surfcoat.2016.05.045

MICROPLASMA SYNTHESIS of BIOCOMPATIBLE COATINGS with ADDITIONS OF MAGNESIUM, SILICON AND SILVER on PURE TITANIUM from HOMOGENEOUS ELECTROLYTES

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Abstract

The coating was produced by microplasma process (plasma electrolytic oxidation, microarc oxidation) of Ti substrate. The coatings formed in basic solution containing Ca^{2+}, $EDTA^{4-}$, PO_4^{3-}, Mg, Si, Ag were selected as additives in the anodizing bath to produce modified Ca/P coatings. The morphology, phase and elemental composition of the coating were characterised using scanning electron microscopy, X-ray diffraction and EDX analysis. The results showed that Mg, Si, Ag additions was successfully incorporated. The coatings mainly consists of anatase, rutile and calcium phosphates and besides Mg incorporated coatings contain additionally $CaMg(CO_3)_2$, $CaCO_3$, $MgCO_3$ and $Ca_{9.5}Mg_{0.5}P_7O_{28}$; the Si-incorporated coatings contain additionally $CaTiSiO_5$ phases. The way was found to regulate the characteristics of the coatings by introducing desired elements, such as Mg, Si, Ag by microplasma technique.