

A NEW APPROACH TO HYDROXYAPATITE-GELATIN COMPOSITE COATINGS ON TITANIUM

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Biomimetic apatite coatings may be formed on an inert material stable to dissolution, polymer as an example. This method has been successfully used for coating various polymeric materials, including the surface of fibers or fabrics. These can be used to make implantable structures, such as matrices for bone regeneration through cellular techniques. The imparted properties of these structures can be similar to those of the natural bone tissue, including high fracture resistance and low modulus of elasticity.

Synthesis of the coatings on the plates for the HA system was performed in the presence of 1%, 2% and 3% gelatin. A hydroxyapatite suspension was prepared with the addition of gelatin, and then the titanium substrate samples were immersed in the suspension. The pH was 7.4, which corresponds to the physiological pH value.

The dependencies of the HA crystal growth and the coated surface areas for the VT1-0 titanium alloy with etched and untreated surfaces was studied by optical microscopy. The phase composition of the prepared suspend was investigated by XRD (DRON-3) and IR spectroscopy ("FT-02" spectrophotometer). The peaks in the diffraction patterns were identified using the JCPDS card files and the software DifWin4.0 and Crystallographica Search-Match. The surface morphology was studied using optical microscopes Neophot 2 (and MBS-9, and a scanning electron microscope JEOL JSM-6610LV.

According to the results obtained by scanning electron microscopy (Fig. 1), in all the cases, the HA-gelatin (эта аббревиатура то же самое, что выше обозначено как HA) coating was formed with characteristic hexagonal crystal structure.

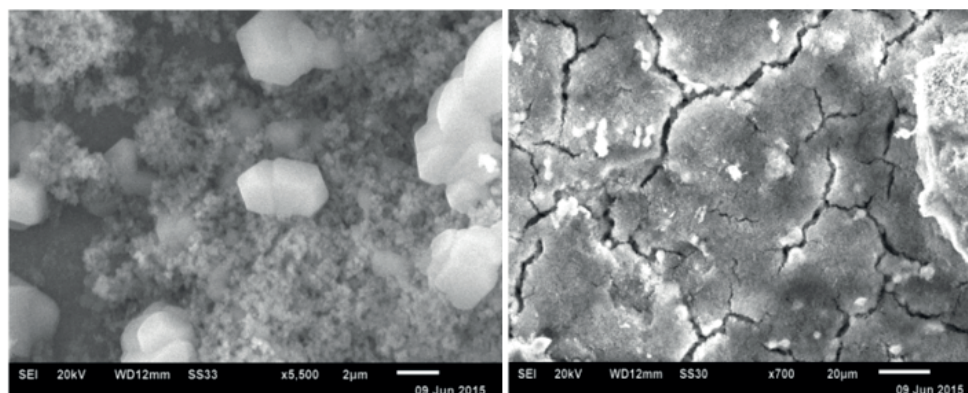


Fig. 1. Surface morphology of the hydroxyapatite crystals grown on the polished surface of the VT1-0 titanium alloy.

It is established that all the samples synthesized in the medium of the model solution of the extracellular fluid at varying concentrations of gelatin are single-phase and represent hydroxyapatite. Enhanced HA-gelatin//HA deposition on the titanium substrate surface is found to occur on etched samples. It is revealed that exposure of titanium substrates to PIB with $j=100 \text{ A/cm}^2$ makes possible further growth of HA crystals and regeneration of the metal implant surface.