CERAMIC-POLYMER COMPOSITES WITH NANO HYDROXYAPATITE FOR ORTHOPEDIC IMPLANTS

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Introduction

Bioactive materials which can support bone ingrowth and osseointegration are common used in orthopedic and dental applications. Bioactive hydroxyapatite can be obtained by the microwave reactor and the high pressure consolidation technology for ceramic materials. The morphology, grain size and specific surface area of the nanopowder can be controlled by the microwave reactor [1].

Materials and Methods

The aim of the GoIMPLANT project was to develop resorbable, tough, strong and biocompatible hybrid composite implants in according to patient's needs. Nano HAP and polymer were connected to solve the HAP brittleness problem. To get better mechanical properties in our laboratory we used combination of GoHAP™ and biocompatible polymers like polylactic acid (PLA) or polycaprolactone (PCL). HAP is one of the inorganic component of hard tissues, which is manufactured in the Institute of High Pressure Physics of the Polish Academy of Sciences (IHPP) and it is called GoHAP™.

Results and Discussion

Biodegradable composites can be decomposed naturally after a certain period of implantation with their degraded products, which will stay inside the human body. Mechanical and biological performance of composites for implantation depends on the degradation rate. Used degradation medium, the pH and temperature like in human body can determine the degradation test.
Testing the changes of Ca^{2+} concentration of the solution, the conductivity and pH under equilibrium conditions at 37°C PBS was checked once in a week. After that, changes of dimensions and porosity was measured, and shown in SEM microscopy.

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References

[1] Patent application P-369906, Lojkowski et al, The method of nanoplates and method of nanopowder with nanoplates obtaining from synthetic hydroxyapatite.