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Poster presentation

642 Sonochemical modification of electrospun fibres with hydroxyapatite nanoparticles

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INTRODUCTION:

Electrospun nonwovens are considered by various authors as a scaffold for bone tissue regeneration. In order to increase biocompatibility and promote osteoblast phenotype of the cells, fibres may be coated with ceramic component [1]. Various methods were suggested, eg. mineralisation from simulated body fluid (SBF) [2]. However, this method is time consuming and lead to precipitation of calcium phosphates, which crystal form is not under control during procedure. In our work we propose application of ultrasounds for hydroxyapatite depositions on fibres surface. The aim of this research was to tailor the surfaces properties of nonwoven by sonochemical deposition of hydroxyapatite and properties analysis.

METHODS:

Poly(lacide-co-glicolide)(PLGA) fibres were formed via electrospinning technique. Ultrasonic covering with nHAp took place in water bath containing nHAp component per: 3, 15 and 30 minutes. The samples were imaged by scanning electron microscopy (SEM) with EDS mode. The particles embedding in the fibres' surface was visualised by transmission electron microscopy (TEM). For structure characteristic wide angle X-ray scattering (WAXS), gel permeation chromatography (GPC) and differential scanning calorimetry (DSC) was used. Mechanical properties of the nonwoven were analysed in tensile test.

RESULTS AND DISCUSSION:

SEM imaging confirmed presence and homogenous distribution of nHAp particles on fibres surface. TEM analysis confirmed that nHAp particles are embedded only in outer layer of the fibres. EDS analysis, as well as WAXS measurement confirmed presence of calcium/phosphorous and nHAp crystal structures, respectively. DSC revealed no significant changes in glass transition temperature nor melting temperature of PLGA. TGA analysis proved increasing amount of embedded nHAp with increasing time of sonochemical procedure, as well as significant shift of half decomposition temperature of PLGA into higher values. GPC analysis revealed slight decrease of PLGA average molecular weight and increase of chain polydispersity.

CONCLUSION:

Ultrasonic deposition of nHAp particles is quick and efficient method of particles incorporation into electrospun fibres' surface. This method do not change structure and mechanical properties of electrospun nonwovens. Due to those advantages it is suitable for use in industry scale.

REFERENCES:

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