

Designing of macroporous magnetic bioscaffold based on functionalized methacrylate network covered by hydroxyapatites and doped with nano-MgFe₂O₄ for potential cancer hyperthermia therapy.

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Streszczenie

In this paper, we report on synthesis and characterization of three-dimensional biocomposite based on a polymerized 3-(trimethoxysilyl)propyl methacrylate/ethylene glycol dimethacrylate (pTMSPMA/pEGDMA) framework. The resulting composite was doped with Ca²⁺ and PO₄³⁻ or decorated by hydroxyapatite (HA) and carbonate hydroxyapatite (CHA) to aid potential bone fixation and the in vitro bioactivity was evaluated. During the construction of the macroporous scaffold, the size and shape of pores were modified depending on the type of porogens which was applied (commercially available sugar, NaCl, or NH₄Cl). Delivered 3D biomaterial was next used in preparation of a magnetic scaffold containing the core/shell magnetic nanoparticles covered with silicon-rich layer creating the amorphous magnetic dead layer. Preliminary magnetic studies showed that nanocrystalline MgFe₂O₄@SiO₂ possesses a superparamagnetic properties, narrow hysteresis loop and virgin curve. The developed magnetic scaffold fulfills the requirements of a promising biomaterial for potential cancer hyperthermia therapy.

Słowa kluczowe

bone, organic–inorganic hybrids, scaffolds, Cancer, Hyperthermia, Spinel, MgFe₂O₄, Hydroxyapatite

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