

Electrodeposition of hydroxyapatite on vertically-aligned carbon nanotube/conductive polymer composite

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Most implants currently used in surgery are manufactured from stainless steel alloys, because of their satisfactory mechanical properties and availability. However, significant problems are associated with stainless steel implants for fracture fixation, including the stress-shielding phenomenon, the risk of late infection, allergic or toxic reactions and the necessity for removal of some implants [1]. Different efforts have been addressed to develop a generation of biomaterials with the ability to interact with the biological environment. Biodegradable polymers of synthetic and natural origin, such as poly(butylene adipate-co-terephthalate) (PBAT), have been extensively studied and used in many tissue engineering applications, such as bone substitution, repair of bone fractures, cartilage, meniscus and intervertebral disc [2]. This work presents the production of nanocomposites based on conductive poly(butylene adipate-co-terephthalate)/polypyrrole membrane with incorporated vertically aligned multiwall carbon nanotube (VACNTO) and hydroxyapatite crystals (Conductive Membrane/VAMWCNTO/HAp), with uniform morphology and good mechanical strength. We have developed a membrane with soluble PPy (1%, 3% and 5%) synthesized with dimethylformamide (DMF) as dopant, PBAT (Ecoflex, Basf, 12%) as membrane's matrix, VACNTO was produced in a furnace in which the carbon source is methane, on the Ti surfaces (10x10x1mm), subsequently VACNTO was transferred to the conductive polymer membrane, on the VACNTO was electrodeposited HAp crystals. Acknowledgment: The authors thank the FAPESP for financial support (2013/09684-0), (2011/20345-7) and (2011/17877-7). References: 1-F. C. Bakker; G. J. Eggink; M. L. M. J. Goessens; H. J. T. M. Haarman; C. Lefèvre; D. Le Nen; P. Patka; M. J. M. Segers; J. W. J. L. Stapert; J. P. A. M. Verbruggen. Practice of Intramedullary Locked Nails - pp 109-127 (2002). 2-K. Fukushima, M-H. Wu, S. Bocchini, A. Rasyida, M-C. Yang. Mat Sci Eng C 32 (2012)