INTRODUCTION AND OBJECTIVES:

Nanocomposites based carbon nanotubes vertically aligned and with superhydrophlicity nanohydroxyapatite (VAMWCNT-O2/nHAP) are strong candidates for use as nanobiomaterials for the regeneration of bone tissue. In addition to providing improved mechanical resistance of hydroxyapatite, which is a ceramic material of low resistance to mechanical stresses, carbon nanotubes (CNT’s) provides sustainable material. The combination of both becomes emergent promising and sees the possibility of applying them as substitutes for the permanent prostheses used nowadays.

The objective of this work was the production of bioabsorbable nanocomposite VAMWCNT-O2/nHAP/bioabsorbable polymers homogeneously by electrospinning solutions of Poly(caprolactone) (PCL) and Poly(lactic-acid) on the surfaces of VAMWCNT-O2/nHAP.

RESULTS AND DISCUSSION

PRODUCTION AND CHARACTERIZATION OF NANOCOMPOSITES:

The Carbon nanotubes were grown at INPE in a Plasma Microwave reactor, using the Chemical Deposition Via Vapor-Phase Technique, and then were functionalized in a Oxygen Plasma reactor (O₂), in order to make the nanotubes superhydrophilities.

The incorporation of the NanoHdroxiiapitita (nHAp) in VAMWCNT-O₂ was made by electrodeposition technique at NANOBIIO.

The process of electrospinning on VAMWCNT-O₂/nHAp was performed on the DEMA - UFSCar and the VAMWCNT-O₂/nHAp was used as substrate, being fixed in the metal collector. The temperature and humidity were controlled throughout the process, maintaining at 23 ± 1 °C and 45 ± 3% respectively. The electrospinning occurred at a voltage of 12KV for both polymer solutions.

The polymer solutions maintained the following parameters:

- PCL solution at a rate of 0.12 g / ml dispersed in chloroform/ methanol (75/25% v/v). Working distance of 8 cm.
- Solution of PLA at a rate of 0.07 g / ml dispersed in chloroform / dimethylformamide (60/40% v/v). Working distance of 10 cm.

CONCLUSION:

- Based on the data collected by Neto et al. of electrospinning on VAMWCNT-O₂/nHAp substrates was found that it is possible to use the same for the production of self-sustaining nanobiomaterials including polymeric matrix for fixation.
- The diameter presented by the fibers is sufficient to coat the granules VAMWCNT-O₂/nHAp. Thus, the nanofibers can incorporate nanoparticles and give them self-sustainability, which, in future, would facilitate their insertion in vivo.

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