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Effect of Alginate-CNT Composites on $CaCO_3$ Crystals by Using Electro-crystallization

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Extended Abstract

Carbon nanotubes (CNT) represent versatile materials with novel properties useful in many applications such as medicine, nanotechnology, electronics, optics, and other fields of materials science. The use of acidic functionalized CNT as template for controlling crystal nucleation and growth is a fast growing research field. Functionalized CNT suspensions may control crystallization and morphology of $CaCO_3$ crystals and act as modulator of crystallographic aspect and kinetic growth. It is well known that $CaCO_3$ is an important constituent of many biomaterials found in nature, primarily in the exoskeleton of organisms living in water, such as mollusks, egg-shell, coccolithophores and crustaceans.

Alginate (ALG) is a biocompatible polymer, with potential applications. Recently, our group has extracted and purified ALG from Chilean coast, that is, *Lessonia nigrescens* and *Lessonia trabeculata*. Biopolymers have been used as template for crystallization of calcium salts and $CaCO_3$ using gas diffusion method. The ALG can act as an organic template in the electro-crystallization of $CaCO_3$ (Pavez et al., 2005).

In this work, ALG- MWCNT composites were obtained and characterized. The effect of ALG-MWCNT as template on $CaCO_3$ electro-crystallization was evaluated. By using an electrochemical approach, we studied the influence of deposition time, ion concentration and the addition of promoters and/or inhibitors during the *in vitro* $CaCO_3$ crystallization. The electro-crystallization of $CaCO_3$ on ITO electrodes was performed using the procedure reported by Lédion et al. (1985).

The electrochemical measurements were performed on a potentiostat (Epsilon Bas) instrument. The electrolyte solution for the electro-crystallization consisted of a $CaCl_2$, $NaHCO_3$ and NaCl mixture, saturated with molecular oxygen. The obtained $CaCO_3$ crystals were characterized by XRD and SEM. The MWCNT and ALG-MWCNT composites showed different chrono-amperometric measurements and had an influence on the $CaCO_3$ crystallization. The structural and chemical relationship shown by the hybrid composites reveals its great potential as a biomaterial and efficient modifier template for the $CaCO_3$ crystallization.

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