

Effect of Functionalized Multiwalled CNTs on the Selective Formation of Calcium Oxalate Crystals by Electrocrystallization

Vargas-Fernández A.

Sánchez M.

Díaz-Soler F.

Vásquez-Quitral P.

Yazdani-Pedram M.

Neira-Carrillo A.

The electrocrystallization (EC) of calcium oxalate (CaOx) crystals in the presence of multiwalled carbon nanotubes (MWCNTs) functionalized with itaconic acid (IA) and the monoester derivatives monomethylitaconate or mono-octadecylitaconate, which were used as new IA-ester templates supported on indium tin oxide glass substrate as working electrode, was performed by applying a 9 mA current at 37 and 60 °C for 5 min. Under the above EC reaction conditions, a broad variety of CaOx morphologies and crystal forms was found. The morphology control and coexistence of CaOx monohydrate (COM) and CaOx dihydrate was achieved through in vitro EC according to X-ray diffraction spectra. We found that all the functionalized MWCNTs were more efficient inhibitors of CaOx crystallization than the typical citrate model, where MWCNT-IA was the most effective stabilizing template of COM crystals, because carboxylic acid groups of IA moieties in MWCNT-IA would be better Ca²⁺ ions binding sites than IA ester groups. Copyright © 2019 American Chemical Society.