

Alginate from *Lessonia Nigrescens* as Template for CaCO_3 Crystals Obtained By Electro-Crystallization

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Extended Abstract

Calcium carbonate (CaCO_3) is one of the most abundant biominerals in nature and investigated at the laboratories, as well. CaCO_3 has abundant industrial applications such as filler materials, bleaching agents, opacity reducer, paper filling, and biomedical applications such as drug delivery and orthopaedic-traumatology. For example, carbonate apatite acts as bioceramic implant. On the other hand, alginate (ALG) is a natural biopolymer composed of β -D-mannuronic acid (M) and α -L-guluronic acid (G) co-units monomers. ALG is biocompatible, exhibits low toxicity, has low cost and shows mild gelation by the addition of divalent cations (Ree K.Y. et al., 2012). ALG acts as an organic template for the *in vitro* CaCO_3 crystallization, controlling the morphology and crystalline structure of CaCO_3 in a similar way of some biomolecules in nature. Recently, our group has extracted ALG from Chilean *Lessonia nigrescens* brown seaweed, and it showed promissory results in clinical applications for cell therapy.

Herein, we evaluated the effect of ALG from *Lessonia nigrescens* on *in vitro* CaCO_3 crystals obtained by an electro-crystallization method. This technique was performed using the procedure reported by Lédion et al. (1985). ALG acts as organic template and substrate modifier controlling the polymorphism and morphology of the CaCO_3 particles. The electrochemical measurements were performed on a potentiostat/galvanostat instrument. The obtained CaCO_3 crystals were characterized by XRD and SEM. Control experiments showed CaCO_3 crystals with uniform sizes and homogenous distribution, resulting calcite in a higher proportion. For the other hand, according to the conditions of the ALG template, the morphogenesis of the crystals was different. CaCO_3 crystals obtained on a thick ALG template showed romboedric structures and hierarchical spherical crystals. However, when the ALG template was thinner, crystals were smaller and with an incomplete morphology. The most distinctive feature of these crystals is the appearance of being formed by nanostructures, described in non classical crystallization.

This work may contribute to the design, development and manufacturing of future hybrid materials for biocompatible implants and drug delivery.

This research was supported by FONDECYT 1140660, FONDAP ACCDiS 15130011 granted by the Chilean Council for Science and Technology (CONICYT) and Program U-Redes, Vice-presidency of Research and Development, University of Chile.

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