Interfacial interaction of calcium carbonate in the context of biomedical aplications

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Calcium carbonate is one of the most abundant minerals in nature and being widely available and repeatedly proposed for medical applications [1]. The biocompability and bioresorbability of $CaCO_3$ – impressively demonstrated by calcarous biominerals – allows its exploitation as a bioceramic material for implantation purposes, and for other biomedical applications such as drug delivery [2].

Calcium carbonate typically occurs in form of a crystalline polymorph (mainly calcite, aragonite, or vaterite). Also various forms of amorphous calcium carbonate (ACC) exist which can rapidly crystallize at ambient temperature and pressure, especially in a humid environment [3].

In this work, we examine the time-dependent structural evolution of different polymorphs of $CaCO_3$ (calcite, aragonite, vaterite, ACC) triggered by immersion into different kind of buffer solutions: water, simulation body fluid (SBF) in presence and absence of polymers, respectively. These studies shall provide a profound basis for a future deliberate design of a calcareous bioceramic material.

[1] Addadi *et al.* (2003) *Adv. Mater.* **15**, 12, 959–970. [2] Lemos & Ferreira (2000) *Mater. Sci. Eng. C*, **11**, 1, 35–40. [3] Barhoum *et al.* (2015), *J. Mater. Sci.* **50**, 24, 7908–7918.