Dynamic light scattering study of amorphous calcium phosphate formation

D. Domazet Jurašin[1*], I. Erceg[2], V. Čadež[1], S. Šegota[1], M.Dutour Sikirić[1]

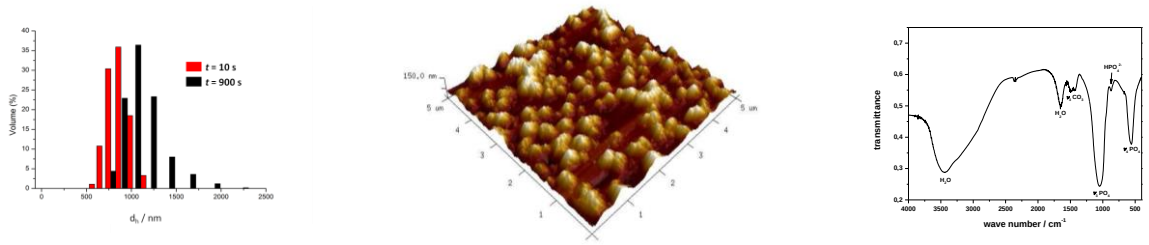
[1]*Ruđer Bošković Institute, Zagreb, Croatia*
[2]*Faculty of science, University of Zagreb, Zagreb*

**djurasin@irb.hr*

Amorphous calcium phosphate (ACP) attracts attention as a precursor to calcium phosphates (CaPs) formation *in vitro* and *in vivo* and due its excellent biological properties [1-3]. In general, the dominant mechanism of ACP formation *in vitro* is aggregation. Calcium and phosphate ions associate forming prenucleation clusters, which aggregate to spherical ACP nanosized particles, which in turn aggregate to chain-like aggregates [1,4]. A widely used technique for following nanoparticles aggregation in general is dynamic light scattering (DLS). However, DLS was scarcely used for the investigation of calcium phosphates [5]. The aim of this research was to use DLS for following ACP formation kinetics at different supersaturations.

Precipitation of ACP was initiated by fast mixing of equimolar reactant solutions. Induction time for nucleation of crystalline phase, i.e. time needed for the commencement of ACP transformation, was determined from potentiometric measurements. DLS was used to follow the changes in ACP particles sizes during induction time. Information about initial formation rates was obtained from initial change of hydrodynamic diameter of particles with time, when this change was linear [6]. Formed ACP was characterized by FT-IR spectroscopy and atomic force microscopy (AFM).

During induction time spherical particles and their chain like aggregates, characteristic for ACP, were formed as confirmed by AFM and FTIR. The initial formation rates, as well as the size of the particles, depended on the initial supersaturation.



a) **b)** **c)**

Figure 1 Distribution of hydrodynamic diameter (a), atomic force micrographs (b) and FTIR spectra of amorphous calcium phosphate particles formed at highest investigated supersaturation.

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