Eco-friendly synthesis of Hydroxyapatite nanoparticles by Liquid Flame Spray

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Calcium phosphate-based (CaP-based) bioceramics have been widely applied in biomedical applications (such as dental roots, hard (bone) tissue engineering, bioimaging, drug/gene delivery, coating metallic implants, etc.) for the last two decades. This is because of their excellent biomedical properties, which include biocompatibility, bioactivity, osteoconductivity, and osteoinductivity, as well as favorable mechanical, surface, and physio-chemical properties. Among the phases of CaP bioceramics, Hydroxyapatite (HA, $Ca_5(OH)(PO_4)_3$) has gained the most attentions as it is the main inorganic constituent of bones, dentin, and enamel. Therefore, developing a simple, fast, and/or up-scalable synthesis method for HA nanoparticles has gained intensive attention.

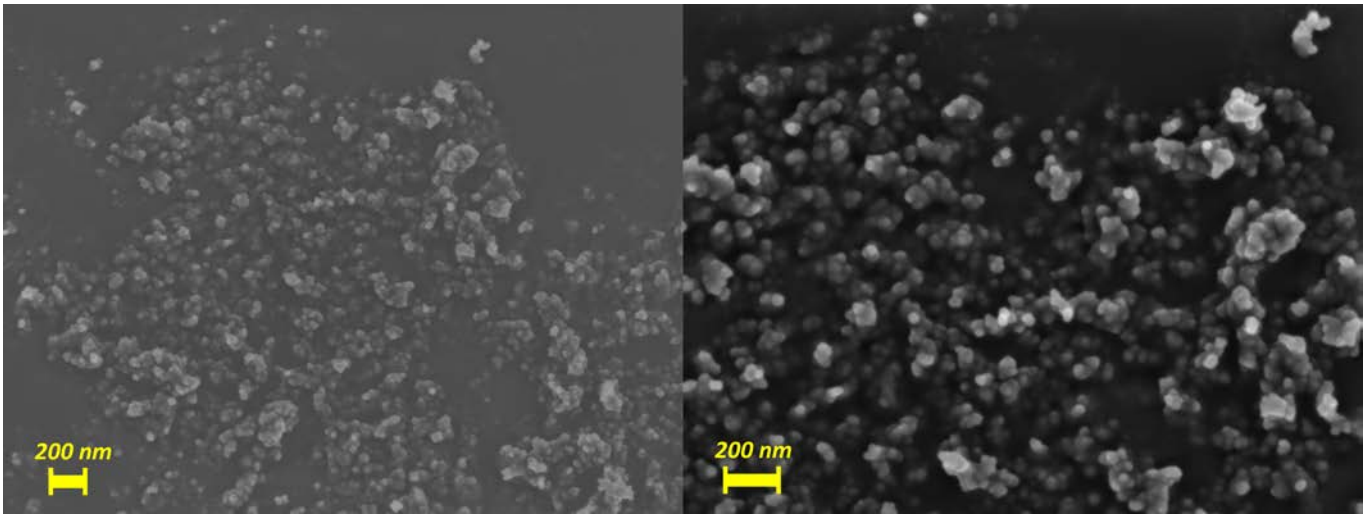

Figure 1. SEM images of Flame-made HA nanoparticles.

In this study, HA nanoparticles were successfully synthesized by an eco-friendly, continuous, simple, fast, and up-scalable aerosol synthesis method. Ca and P precursors have been dissolved in only deionized water then the precursor solution fed into a H_2/O_2-flame to develop an eco-friendly synthesis route of HA nanoparticles. After that, the flame-made nanoparticles were collected directly from the gas flow as a powder with an electrostatic precipitator. Thereafter, effect of synthesis parameters on the structural properties of the flame-made nanoparticles were investigated by applying different analyses methods such as XRD, SEM, BET, etc.

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