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# Calcium Phosphates Bioceramics for Bone Tissue Engineering

## Synthesis

### Methods

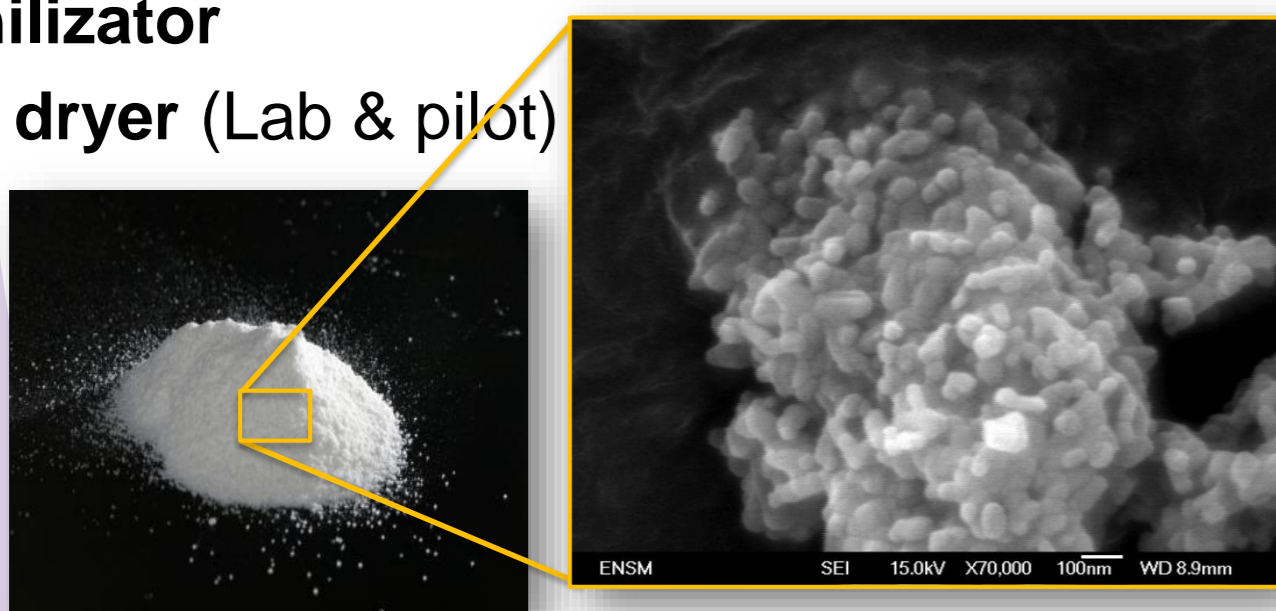
- Aqueous Precipitation
- Sol-Gel route

### Calcium phosphates (CaPs)

- Conventional: HA,  $\beta$ -TCP
- Bioresorbable: Carbonated Hydroxyapatites (CHA)
- Others: SiHA, SrHA, SiCHA, SrCHA, polysubstituted...

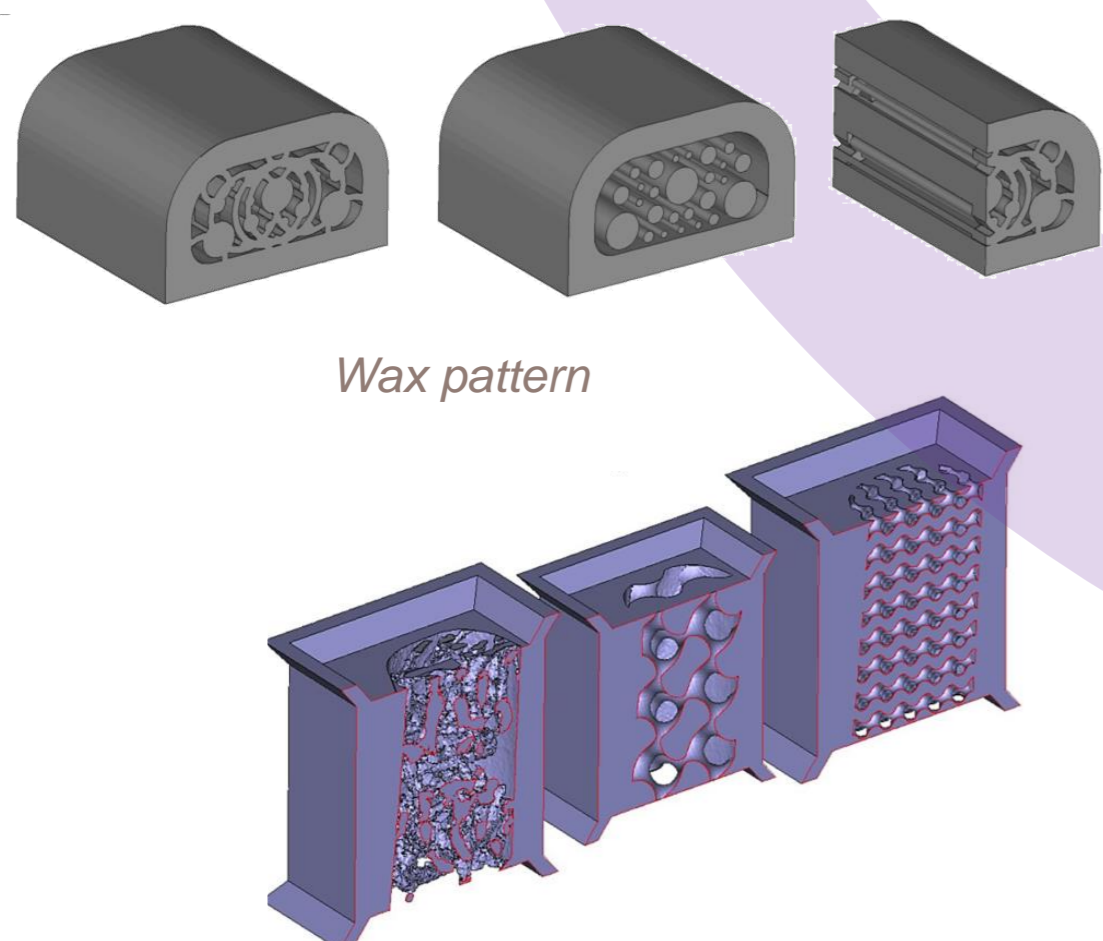
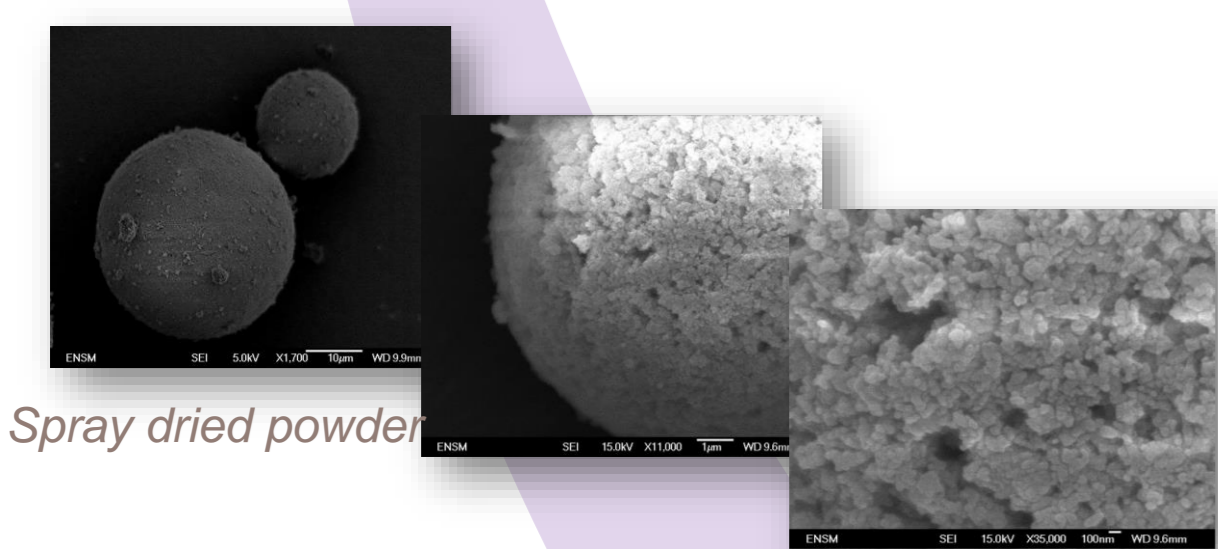
## Separation method

- Centrifuging separator
- Lyophilizator
- Spray dryer (Lab & pilot)



## Shaping & Additive Manufacturing

- Spray drying
- Template casting (PMMA beads, wax patterns)
- Additive manufacturing processes (SLM, 3D printing)



## Heat-treatment

Debinding and sintering under controlled atmosphere

- Inert gas ( $N_2$ , Ar)
- Reactive gas (Air,  $CO_2$ ,  $H_2O$ )

## Calcium Phosphates

Natural bone composition (Mineral part)



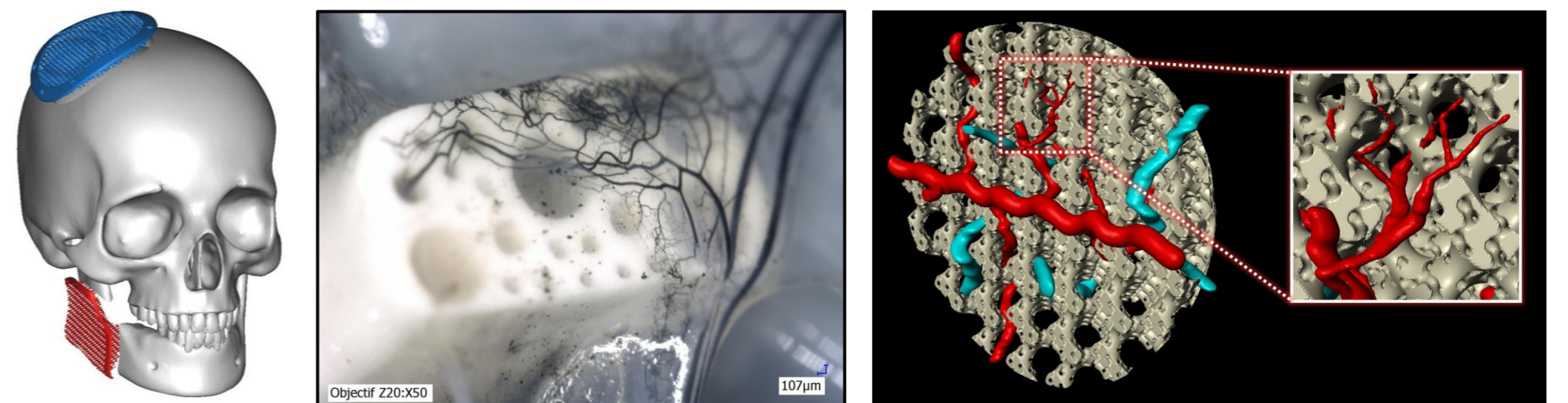
Hydroxyapatite (HA)



Relevant Substitutions for biomedical applications



## Bone Tissue Engineering



## Bioceramics

