



## Thesis Project Form

**Title (tentative):** Metal ions doping to enhance the bioactivity of calcium phosphates as fillers in 3D printing of dental devices

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### Description

#### Motivation and application domain

Calcium phosphates are used as bone substitutes due to their biocompatibility and osteoconductive properties. The doping with metal ions of calcium phosphates can be a method to improve their bioactivity and other parameters, such as their antibacterial, anti-inflammatory, antiosteoporotic, or angiogenic properties. Three types of metal ions can be considered: Zn, Sr, and Cu. The resulting material will be used as a filler in polymer matrices for 3D printing of dental devices.

#### General objectives and main activities

The experimental thesis will be conducted in the Materials Engineering Laboratory, where calcium phosphates doped with metallic elements will be prepared through precipitation processes or solid-state reactions between salts. The resulting material will be characterized from a chemical-physical, microstructural, and mechanical perspective to evaluate the changes that these doping elements can induce on the phosphate's properties.

#### Training Objectives (technical/analytical tools, experimental methodologies)

The student will prepare calcium phosphates doped; he/she will use instrumentation for microstructural (SEM), chemical-physical (X-ray diffractometry, FT-IR, IR-ATR, wettability), thermal (TG-DTA, dilatometry), and mechanical analysis of ceramic materials.

**Place(s) where the thesis work will be carried out:** Laboratorio Ingegneria dei Materiali del DICCA

### Additional information

**Pre-requisite abilities/skills:** Chemistry and Materials Science

**Maximum number of students:** 2