



# Additive Manufacturing of dense ceramic single and multi-materials with complex geometries

## Context

### 3D Micro-extrusion Additive Manufacturing (Robocasting) :

- Print viscous materials thanks to a mechanical pressure
- Printer with 3 syringes possible → Possibility to manufacture multi-materials with different composition and geometries

### Ceramics pastes:

- Zirconia or Alumina from Baikowski
- Gelling agent (Pluronic like) → Homogeneous paste with an adequate rheology behaviour

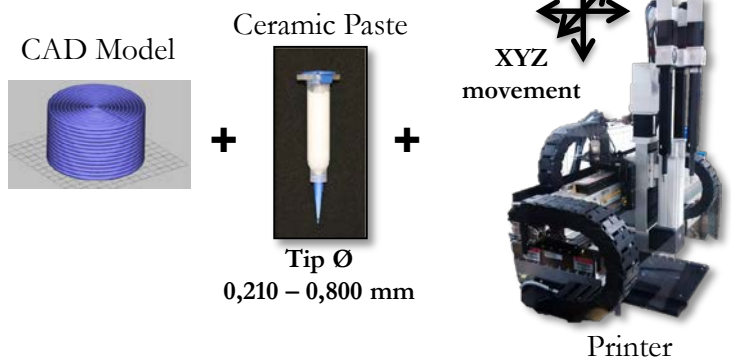
### Aim :

→ Elaborate complex materials with a gradient of composition or multi-materials to reach different properties with a rapid process

## Method and tools

### Printing :

- Choose good printer parameters to obtain denser printed parts (overlap, pitch,,)
- Choose the appropriate design



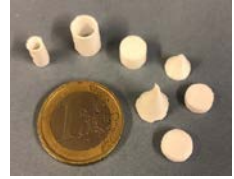
→ Drying → Debinding → Sintering

### Rheological study:

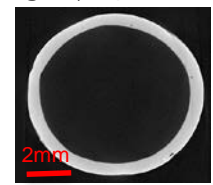
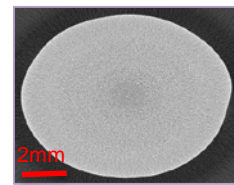
- Yield stress
- Adequate storage modulus and viscosity
- Shear-thinning behaviour
- Healing time (thixotropic behaviour)

## Results

- Print different geometries with mono-material



- Good homogeneity and no defects with tomography



- Start to link Rheological studies and printable behaviour