Développement de matériaux bio-sourcés fonctionnels pour l'impression 3D par extrusion

Development of innovative bio-based and functional materials for the production of 3D smart objects by 3D printing

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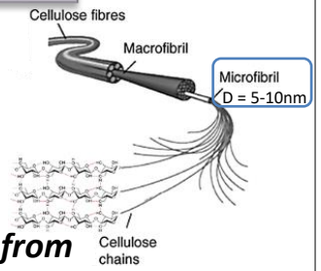
Equipe CoMHet

Context

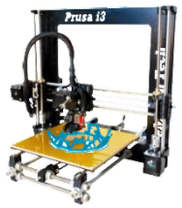
❖ **Nanocellulose**



Cellulose fibrils extracted from renawable biological ressources (tree…)

- Rheology modifier
- Ligthweight material
- Reactive surface (easy functionalisation)
- Bio sourced material (eco – conception)

❖ **Additive manufacturing (3D printing)**



Process of manufacturing a 3D solid object from a digital file one layer at a time.

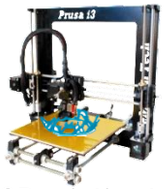
- Complex and lightweight designs
- Short manufacturing lead time
- Free design modification
- Compatible with a broad range of material
  metal, plastics, ceramic, gel, food…

Method

Formulation : Inert + functional material

- Homogeneous flow through a 1 and 0,5mm nozzle
- Maintaining of filament and 3D solid shape after printing
- Maintaining of the 3D solid shape after air drying

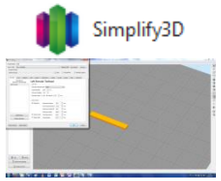

Rheological studies

Extrusion & 3D printing trial

3D printer : Optimization

- Software parameters (layer height, extrusion width, printing speed..)
- Device customization (dispensing, nozzle design, plate material…)
- 3D simple geometry to more complex one



Software settings choice


Device modelisation

Characterization

- Mechanical and thermal properties of the 3D printing part
- Dimensional reliability and structure (porosity)
- Durability (aging, recycling)


Mechanical testing


Dimensional control