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Fabrication of copper objects through lithography-based metal manufacturing

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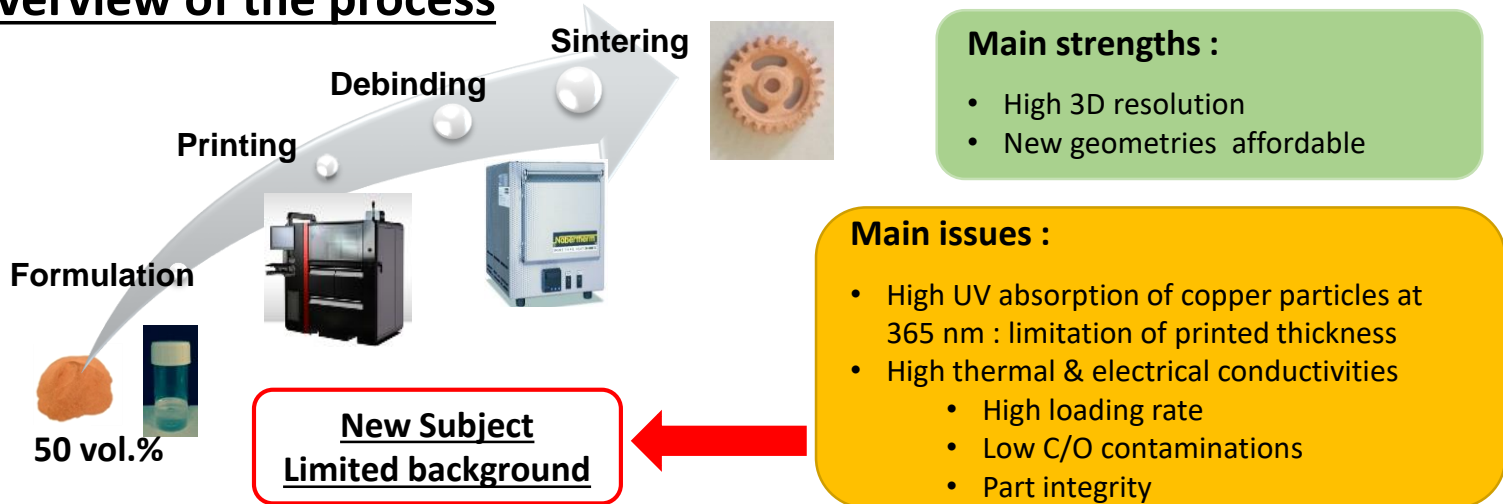
HAL Authorization

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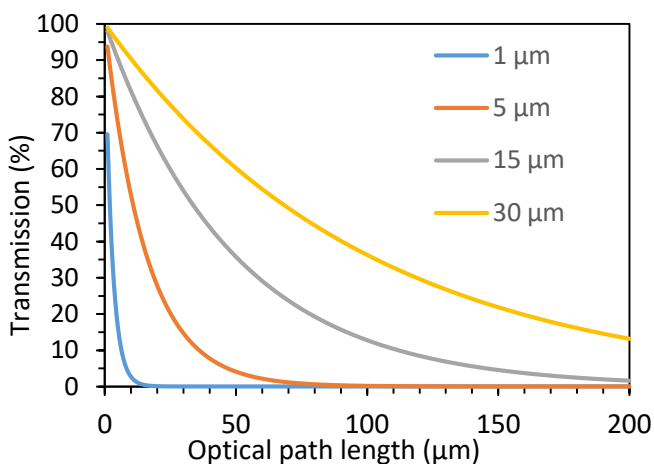
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Overview of the process



Modeling of UV transmission in a layer according Mie's theory



$$T = \exp(-N \times l \times \sigma_{ext})$$

σ_{ext} : extinction cross section (m²)

N : Particle concentration (ptcl.m⁻³)

l : optical path length (m)

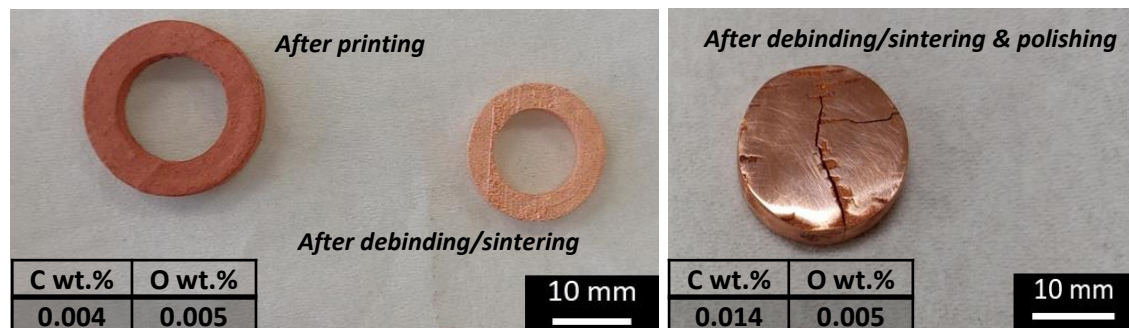
45 wt.% (=10 vol.%) @ 365 nm

Large particle diameter

→ enables a high depth penetration of light

Printing and thermal treatments of the first objects

- $d_{50} = 18 \mu\text{m}$ & **90 wt.%**
- Layer thickness = 25 μm
- Exposition time = 5.1 s
- Irradiance = 84 mW.cm⁻²
- $\lambda = 365 \text{ nm}$



Conclusions

- ✓ Printing copper parts by LMM with a high loading rate
- ✓ Low C&O contents → no impact on conductivities
- ✓ Part integrity achieved with wall thickness < 2mm

Perspectives

Achievement of crack free objects for characterizations (thermal & electrical conductivities)

- ↘ polymer crosslinking density
- optimized thermal debinding