

## PHOTO-THERMAL PRINTING OF METALS AND METAL COMPOSITES IN 2D AND 3D (BIRAD)

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### The Problem

While 3D printing of polymeric materials is prevalent, metals are indispensable for structural support, heat dissipation and electrical conductivity. Extensive research to allow additive manufacturing (AM) of metals has resulted in a range of techniques, the most established of them are selective laser melting (SLM), electron beam melting (EBM) and metal inkjet printing. Alas, these methods are not suitable for the microscale regime due to minimum line width of tens of microns, limited by the size of metal particles used and heat dissipation.

### The Solution

Our new technology, based on photo-thermal reduction of metal ions, is breaking new ground in several aspects:

- Very fine (~1  $\mu$ m feature size) single metal OR multiple metals structures.
- Very good and homogenous structure with very fine surface roughness due to the built-in sintering process.
- Ability to combine nano-diamonds, nano-carbon particles and such (composite formation) for better finished material properties (either electric, magnetic, heat transfer etc.)

### The Commercial Benefit

This technology aims at 3D printing of metals, alloys and metal composites with high resolution (~1  $\mu$ m in X,Y and ~300nm in Z). A unique method of 3D printing has been developed, with the following advantages over existing worldwide technologies:

- This technology does not require expensive femto-second lasers, but rather cheap CW lasers (