

COINAGE METAL NANOPARTICLES FOR NANOINKS

Patent Pending

SD# 14202.1

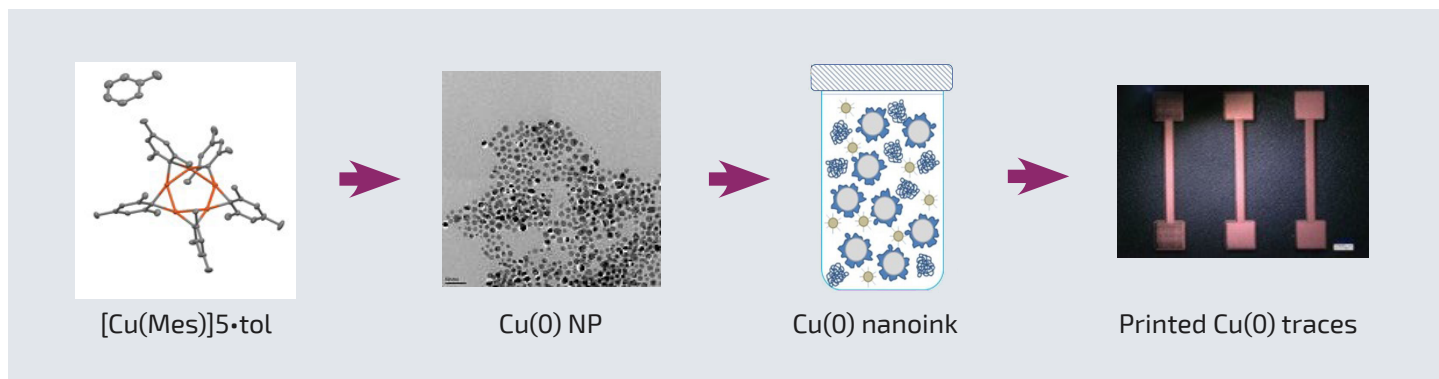
Technology Readiness Level: 3

Analytical and experimental critical function and/or characteristic proof of concept

A simple, rapid, and volume-scalable method to produce high quality coinage metals for nanoinks

Printed and flexible electronics are a fast-growing area of interest with commercial applications ranging from wearables, smart packaging, photovoltaics, to lighting and displays. Nanoparticle-based functional inks (nanoinks), particularly those with conductive properties, play a significant role in the market realization of this emerging area.

Sandia researchers developed a simple and scalable method of generating high quality coinage metal nanoparticles that addresses the need for the rapid, high volume production of nanoinks. The technique was demonstrated with copper using a xylene-based solvent and a hyperdispersant. Dynamic light scattering (DLS), powder X-ray diffraction (PXRD), and transmission electron microscopy (TEM) studies were used to confirm nanoparticle size and qualities measuring 6-16 nm at temperatures between 160-185° C, depending on scale. The resulting nanoinks were found to support architectures with high quality copper patterns in aerosol and inkjet printing applications in the sub 50 µm range.



TECHNICAL BENEFITS

- Aerosol and inkjet compatible
- Air-stable
- Reduced time and temperature compared to other methods
- Compatible with multiple metal types (copper, silver, and gold)
- Low viscosity (sub 50 µm range)
- Scalable for large volume requirements

INDUSTRIES & APPLICATIONS

- Additive Manufacturing
- Direct-Write Advanced Manufacturing (DWAM)
- Microelectronics