Conductive Inks for 3D Printing
Technology #20091

Applications

This technology uses a novel conductive ink to manufacture electronic components. Through 3D printing, the ink can cost-effectively build improved size weight and power (SWaP) devices, microfluidic devices, and a variety of other electronic devices with high resolution and strong metallic conductivity.

Problem Addressed

3D printing has become one of the most convenient approaches for on-demand prototyping. Through methods like laser sintering and ink jet printing, powdered metals can now be rapidly manufactured into electronics. Unfortunately, due to the complexity of high-temperature laser processes, 3D printing electronics is more expensive than industry-standard subtractive manufacturing methods like CNC milling. This technology proposes a cheaper additive manufacturing process for electronics through an innovative conductive ink composition.

Technology

The 3D printing technology presented herein comprises a conductive ink and a method to use the ink for electronic prototyping. The inks are composed of conductive particles, triblock copolymers, and a volatile solvent. This modular system yields printed materials with tailorable conductive properties through appropriate choice of solvent and ratio of conductive particles to triblock copolymers.

The additive manufacturing method developed for this technology uses a solvent cast 3D printing process. Layers of the conductive ink are applied to a substrate, creating micro-interconnect structures. The solvent in the ink evaporates after extrusion, leaving the conductive interconnect structures and eliminating the need for high-temperature sintering. Once dry, the printed component can be integrated into any electronic system, such as a radio frequency (RF) device or a biocompatible medical device.

Advantages

- Cuts manufacturing costs by eliminating need for high-temperature processes
- Increases the type of devices that can be 3D printed (e.g. flexible electronics)
- High resolution and strong metallic conductivity in 3D printed electronic devices

Categories For This Invention:

Electronics & Circuits
Electronic Components
Semiconductors & Integrated Circuits
Lithography
Block Copolymers
Semiconductor Manufacturing
Materials
Micro & Nanotech
Micromachining

**Intellectual Property:**

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