

Synthesis and characterization of highly conductive copper nano-particle ink for inkjet printing applications

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Many industries are focused on the nano particle metallic inks for the fabrication of electronic devices. Silver ink is a typical metallic ink having high conductivity and thermal stability. However, there is a limitation to use it in the fabrication due to its high material cost. Copper is considered as a substitute material for silver, but copper ink has an oxidation issue under atmospheric conditions. Cost effective, highly conductive and oxidation-free copper nano particle ink was synthesized in this study. Copper complexes and copper nano particles were used in the synthesis to prevent its oxidation. Expanding its application to various substrates, the synthesized nano particles were thermally treated at relatively low temperatures in the range of 50~400 °C. The prepared copper ink was printed on the silicon substrates and the printed films were then characterized. Each particle of copper complexes and copper nano particles was analyzed by Thermogravimetric Analyzer (TGA). Sheet-resistance was measured by 4-Point Probe. Surface morphology of the prepared electrode was also analyzed using Scanning Electron Microscope (SEM) and Transmission Electron Microscope (TEM).