# Formation of Copper Nanoparticles Ink Upon Copper Complex Decomposition

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The fabrication of electrical circuits by printing conductive inks is gaining a lot of interest, due to its promising capacity to simplify the production and reduce costs. However, the high price of silver, the most commonly used metal for conductive inks, poses a barrier for wide industrial implementation of this technology. Copper inks are attractive alternative, due to their low price. However, their fabrication is limited owing to the requirement of strong reducing agents in the preparation of nanoparticle (NP) inks or due to low copper content in metal organic decomposition (MOD) inks. Here, we established a two steps process that resolves these limitations by taking advantage of the self-reduction mechanism existing in MOD ink in order to form nanoparticles ink, without using strong reducing agents. First, ~100-300nm copper NPs are prepared by complexation of copper formate with 2-amino-2-methyl-1-propanol in the presence of n-octylamine. Secondly, the copper ink is deposited or printed on a substrate and sintered by thermal heating in 170-250°C. This fabrication method was developed while studying the effect of different parameters (e.g. the ligands used to form the copper complex, the stabilizing agents and temperatures) on the properties of the obtained copper inks and films using SEM, EDS, XRD, TGA-DSC and electrical measurements. The copper ink developed herein can be easily prepared and printed to obtain highly conductive functional electronic circuits opening the path for facile integration of printed electronics in daily life devices. Nevertheless, our current examination of additional parameters may help optimizing it even further.

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