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Inkjet printing of conducting silver patterns on alumina and insulating ceramic-glass by saline precursors

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Abstract

We use ink-jet printing technique to fabricate conducting silver circuits on two substrates of technological interest (alumina and insulating ceramic-glass) using a very simple and cost-effective reduction reaction of silver nitrate ($AgNO_3$) aqueous solution followed by annealing in argon-5% hydrogen atmosphere. Commercial dishwashing detergent is added to the ink to act as surfactant. To achieve homogeneous and connected silver (Ag) patterns, we use a two-steps technique consisting of two printing and annealing steps. Indeed, the second printing step is used to fill up the voids formed during ink evaporation in the center of the first printed pattern due to the "coffee ring effect". We produce conducting Ag line patterns on alumina and insulating ceramic-glass with resistivity values of about 30 and 90 μΩ cm, respectively, which are nearly 20 and 60 times higher than that of bulk silver. These results are preliminary for prototyping hybrid circuits on these ceramic substrates by inkjet technology.