

COMPARISON OF THE RESISTIVITIES OF NANOSTRUCTURED FILMS MADE FROM SILVER, COPPER-SILVER AND COPPER NANOPARTICLE AND NANOWIRE SUSPENSIONS

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Spray deposition and inkjet printing of various nanostructures are emerging complementary methods for creating conductive coatings on different substrates. In comparison to established deposition techniques like vacuum metal coating and lithography-based metallization processes, spray deposition and inkjet printing benefit from significantly simplified equipment. However, there are new challenges related to peculiar properties and behavior of nanostructures that require additional studies. In present work, we investigate electroconductive properties and sintering behavior of thin films produced from nanostructures of different metals (Ag, Cu and Cu-Ag) and different shapes (spherical NPs and NWs), and compare them to the reference Ag and Cu magnetron deposited films. Synthesized nanostructures were studied with transmission electron microscopy. Morphology and crystallinity of produced metal films were studied with scanning electron microscopy and X-ray diffraction. The electrical parameters were measured by the van der Pauw method. Both Ag, Cu and Ag-Cu NWs based films provide high conductivity and require only modest thermal treatment (200° C). To achieve sintering and conductivity of Ag, Cu and Ag-Cu NPs based films higher temperature are required (300 ° C for Ag NPs and 350 ° C for Cu and Cu-Ag NPs). Additionally, stability of NWs was studied by in situ SEM heating up to 500 °C.

References

1. Vlassov, Sergei and Polyakov, Boris and Novikovs, Aleksandrs and Leimane, Madara and Kadiwala, Kevon and Zubkins, Martins and Butanovs, Edgars and Oras, Sven and Damerchi, Elyad and Zadin, Veronika, Comparison of the Resistivities of Nanostructured Films Made from Silver, Copper-Silver and Copper Nanoparticle and Nanowire Suspensions. Available at SSRN: <https://ssrn.com/abstract=4405739> or <http://dx.doi.org/10.2139/ssrn.4405739>



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