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Transport Properties of Ag Nanoparticles in Carbon Matrix Prepared with a Cluster Gun[1] PENG LIU, YUNHE HUANG, MICHAEL BONDER, GEORGE HADJIPANAYIS, Department of Physics and Astronomy, University of Delaware, Newark, DE 19716, DIONISIOS VLACHOS, SOUMITRA DESHMUKH, Department of Chemical Engineering, University of Delaware, Newark, DE 19716 — The use of "cluster guns" with in-situ processing capabilities has been found to be suitable for the fabrication of nanoparticles in a wide range of materials, avoiding external annealing and possible surface oxidation of the nanoparticles[1, 2]. In this study, we have used our cluster gun to fabricate Ag nanoparticles and embed them in a C matrix formed by conventional sputtering. With the increased amount of Ag, the transport properties of thin films show a gradual transition from a semiconductor-like behavior to a metallic one. At cryogenic temperatures, the magnetoresistance (MR) is generally negative at low fields and becomes positive at high fields. The field at which the MR changes sign increases with increased temperature. At higher temperatures (around 20 K), only negative MR is observed. For the samples with semiconductor-like behavior, the temperature dependence of resistance follows the relation $R = R_0 \exp\left[(T_0/T)^{1/2}\right]$ in the temperature range from 5 to 50 K. We are investigating the origin of this behavior and those results will be reported.

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