Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Graphene nanoribbons and nanosheets incorporated in Ag, Al alloys and Cu bulk and thin films[1] LOURDES SALAMANCA-RIBA, XIAOXIAO GE, ROMAINE ISAACS, University of Maryland College Park, DANIEL COLE, US Army Research Laboratory, Aberdeen MD, CHRISTOPHER KLINGSHIRN, MANFRED WUTTIG, KAREN GASKELL, ODED RABIN, University of Maryland College Park — Incorporation of carbon nanostructures in materials has gained high interest because of the possibility of improving the properties of the material due to the properties of the carbon nanostructures. In many instances, however, the material obtained is a composite in which the metal and the carbon do not share any bonds. We are investigating metals with high carbon content, called covetics, where the carbon is introduced by the application of a DC current >100 A to a mixture of the liquid metal and particles of activated carbon. The carbon in covetics forms ribbon like structures of graphene and nano sheets which are bonded to the metal and are, therefore, very stable. We are investigating the structure and properties of Ag, Al and Cu covetics in bulk and thin films as well as the form and structure of the carbon in the metal. 3D epitaxy of graphene nanoribbons with the lattice is observed in both Ag and Al covetics. The carbon has primarily sp2 bonding as obtained by Raman scattering, XPS and EELS. Films of copper covetics grown by PLD preserve the carbon structure and present higher transmittance to light and higher resistance to oxidation than pure copper films making them great candidates for transparent electrodes.

[1]Funded by ANL grant 6F-32302 and ONR grant N000141410042

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Date submitted: 11 Nov 2016 Electronic form version 1.4