Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Graphene Superlattice Construction by Intercalation of Fullerenes at the Metal-Graphene Interface[1] PETRA REINKE, EHSAN MONAZAMI, GOPALAKRISHNAN RAMALINGAM, University of Virginia — The electronic properties of graphene can be modified through the formation of a charge or topographic superlattice, in our study this is achieved by intercalation of fullerene molecules at the interface between copper and graphene. Amorphous and crystalline superlattices can be synthesized and are controlled by annealing T (650 K to 850 K) and time. The crystalline superlattices present a square geometry defined by the Cu(001) facet and the period can be controlled by deposition conditions. The geometric and electronic structure of the superlattice is measured with STM (scanning tunneling microscopy), ST spectroscopy and differential conductivity maps. The intercalation of C60 is confirmed by (i) atomic resolution of graphene on top of molecule, (ii) spectral signature of graphene is modulated with shoulder at 250 meV, (iii) bias voltage dependence of apparent height, and (iv) depth between molecules correlates with intermolecule distance due to mechanical deformation of graphene. The crystalline layer imprints a charge superlattice with 1.5 holes/molecule donated to graphene - while the graphene is nearly neutral in between. The intercalation is a versatile method to control superlattice formation with potential for tuning charge carrier transport.

[1]We acknowledge the support by NSF DMR-100580.

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Date submitted: 15 Nov 2013 Electronic form version 1.4