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UHV STM/STS and AFM study of oxidized graphene sheets
DEEPAK PANDEY, Birck Nano Technology Center, Purdue University, RICHARD PINER, The University of Texas at Austin, RONALD REIFENBERGER, Birck Nano Technology Center, Purdue University — Exfoliated oxidized graphene sheets, suspended in an aqueous solution, were deposited on freshly cleaved HOPG and studied by ambient AFM and UHV STM. The AFM images revealed oxidized graphene sheets with a lateral dimension of ∼5-10 μm. The oxidized graphene sheets exhibited different thicknesses and were found to conformally coat the HOPG substrate. Wrinkles and folds induced by the deposition process were clearly observed. Phase imaging and lateral force microscopy showed distinct contrast between the oxidized graphene and the underlying HOPG substrate. The UHV STM studies of oxidized graphene revealed atomic scale periodicity showing a 0.26 nm × 0.42 nm unit cell over small areas. This periodicity is identified with oxygen atoms bound to the oxidized graphene sheet. I(V) data were taken from oxidized graphene sheets and compared to similar data obtained from bulk HOPG. The dI/dV data from oxidized graphene reveals a reduced density of electron states within ±0.1 V around zero bias.

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