Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Growth of graphene on sapphire by molecular beam epitaxy[1]
SHENG WANG, Columbia University, NY, LARA FERNANDES DOS SANTOS, Universidade de Sao Paulo, Sao Carlos, Brazil, ULRICH WURSTBAUER, LEI WANG, Columbia University, NY, LOREN N. PFEIFFER, Princeton University, NJ, JAMES HONE, Columbia University, NY, JORGE M. GARCIA, IMM-Instituto de Microelectronica de Madrid, Madrid, Spain, ARON PINCZUK, Columbia University, NY — Graphene growth by direct deposition of carbon atoms on dielectric substrates in a MBE environment has potential for large area fabrication of graphene layers. We explore the optimal graphene growth on sapphire c-plane surface with gradients of carbon flux and substrate temperature. Single- and bi-layer nanocrystalline graphene with sharp Raman bands are achieved at temperature around 1200 C. Atomic force microscopy (AFM) images uncover the presence of etch pits which suggest a carbon removal mechanism known as "carbo-thermal reduction". The average spacing between etch pits (of about 100 nm) defines an upper limit of nanocrystal size. Tuning the easily controlled incident carbon flux and the markedly temperature dependent carbo-thermal reduction of sapphire should enable the growth of high quality graphene layers on large area sapphire substrates.

[1]Acknowledgements: ONR graphene MURI

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Date submitted: 11 Nov 2013 Electronic form version 1.4