Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Fabrication and Characterization of Epitaxial Graphene Field Effect Transistors YIRAN HU, YIKE HU, Georgia Institute of Technology, JAN KUNC, Georgia Institute of Technology; Charles University, JEAN-PHILIPPE TURMAUD, JAMES GIGLIOTTI, DOGUKAN DENIZ, YUE HU, Georgia Institute of Technology, VLADIMIR PRUDKOVSKIY, Institut Néel, Université Grenoble Alpes-CNRS, CLAIRE BERGER, Georgia Institute of Technology; Institut Néel, Université Grenoble Alpes-CNRS, WALT DE HEER, Georgia Institute of Technology — We report on planar transistors using epitaxial graphene grown both on the (0001) and the (000-1) face of semi-insulating 4H-SiC, following the work reported by Kunc et al.[1] Epitaxial graphene on SiC is of high quality and holds a high potential for graphene electronics. We use Raman spectroscopy, atomic force microscopy and transport measurements (Current-voltage under various gate voltage) as a function of temperature to investigate the properties of the material and to characterize the devices. On the carbon face (000-1), a 2D Electron Gas (2DEG) is formed between a surface silicate and the SiC bulk after thermal annealing. Multilayer epitaxial graphene (MEG) is used to contact this 2D conduction layer, forming a 1D junction. Results are analyzed in terms of 1D Schottky barrier between the MEG and the 2DEG. The gated structure exhibits on/off ratio up to 5×10^6 at room temperature. Various types of junction structures can also be produced on Si face (0001) of SiC, that involve single layer and structured graphene.

[1]J. Kunc et al. **Nano Lett.** 14, 5170-5175 (2014)

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Date submitted: 11 Nov 2016 Electronic form version 1.4