Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Highly Ordered Graphene for Two Dimensional Electronics[1] RUI FENG, J.R. HASS, E.H. CONRAD, X LI, C. BERGER, W.A. DE HEER, T. LI, P.N. FIRST, School of Physics, Georgia Institute of Technology, C.A. JEFFREY, Dept. of Physics and Astronomy, University of Missouri-Columbia — Many of the same electrical properties of carbon nanotubes can be realized by confining grapheme sheets to nano-dimensions. Scalability issues of nanotube devices can therefore be overcome by lithographic patterning of graphene films if thin well ordered graphene films can be grown. We have been able to grow ultrathin epitaxial graphite films that show remarkable 2D electron gas (2DEG) behavior by thermal decomposition of both Si-face and C-face 4H-SiC. Early studies of the structure of both surfaces of 4H-SiC showed that graphite grown on the C- face was rotationally disordered compared to the Si-face. For this reason the C-face graphite was ignored as a potential substrate for graphitic devices. However, our surface X-ray scattering measurements show that while the orientational order is reduced, the coherent film size of the C-face graphite is more than three time greater than the Si-face. Part of the reason is that the Si-face step density increases dramatically with graphitization while the C-face shows little change in step structure. These observations are consistent with the improved 2D conductivity measurement on the C-face graphite films.

[1]Research funding is supported by NSF-NIRT and Intel.

Rui Feng
School of Physics, Georgia Institute of Technology

Date submitted: 30 Nov 2005 Electronic form version 1.4