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High quality two-dimensional hole system on hydrogen terminated silicon (111) surfaces BINHUI HU, TOMASZ M. KOTT, ROBERT N. MCFARLAND, BRUCE E. KANE, University of Maryland — We have previously developed a novel field effect transistor structure, in which high mobility two-dimensional electrons are induced at a hydrogen-terminated Si(111) surface by a positive gate voltage through an encapsulated vacuum dielectric [1]. In this talk, we will demonstrate that a similar structure can also be used to define a high quality two-dimensional hole system (2DHS) at the H-Si(111) surface with a negative gate voltage. Hole concentrations up to $7.1 \times 10^{11} \text{ cm}^{-2}$ are obtained. The longitudinal and Hall resistivities are measured as functions of magnetic fields up to 12 T. Preliminary data show Shubnikov-de Haas (SdH) oscillations at $B > 3 \text{ T}$ at $T = 5 \text{ K}$. Until now the studies on 2DHSs on Si(111) surfaces are limited, primarily due to the lack of high quality 2DHSs on them. The high quality 2DHS here can provide some new opportunities.

[1] K. Eng, R. N. McFarland, and B. E. Kane, *Appl. Phys. Lett.* 87, 052106 (2005).

Binhui Hu
University of Maryland

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