Abstract Submitted
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Bipolar surface devices on hydrogen-terminated silicon (111) surface BINHUI HU, B.E. KANE, Univ of Maryland-College Park — Two-dimensional systems on hydrogen-terminated Si(111) surfaces show very high quality. The peak electron mobility of 325,000 cm^2/Vs can be achieved at T=90 mK, and the device shows the fractional quantum hall effect [1]; the peak hole mobility of 10,000 cm^2/Vs can be reached at 70 mK, and Shubnikov-de Haas oscillations show a beating pattern due to the spin-orbit effects [2]. With the ability to create both a two-dimensional electron system (2DES) and a two-dimensional hole system (2DHS) on a Si(111) surface, it is natural to develop a bipolar surface device, similar to that on AlGaAs/GaAs heterostructures [3]. The capability to switch between electrons and holes on the same Si(111) surface is helpful for studies of interaction effects and spin related phenomena, since the electrons and holes have very different band structures, and spin properties. We have fabricated the bipolar surface devices with improved gate structures. The characteristics of the devices will be presented and the possible implication will be discussed.

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[3] J. C. H. Chen, D. Q. Wang, O. Klochan, A. P. Micolich, K. D. Gupta, F. Sfigakis, D. A. Ritchie, D. Reuter, A. D. Wieck, and A. R. Hamilton, Appl. Phys. Lett. 100, 052101 (2012)

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