

Abstract Submitted
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One-dimensional Si nanolines in hydrogenated Si(001) BIANCO FRANÇOIS, SIGRUN A. KÖSTER, JAMES G. H. OWEN, CHRISTOPH RENNERT, University of Geneva, DPMC - MaNEP Quai Ernest-Ansermet 24, 1211 Geneva 4, DAVID R. BOWLER, University College London, London Centre of Nanotechnology — We present a detailed study of the structural and electronic properties of a self-assembled silicon nanoline embedded in the H-terminated silicon (001) surface, known as the Haiku stripe. The nanoline is a perfectly straight and defect free endotaxial structure of huge aspect ratio; it can grow micrometre long at a constant width of exactly four Si dimers (1.54 nm). Another remarkable property is its capacity to be exposed to air without suffering any degradation. The nanoline grows independently of any step edges at tunable densities, from isolated nanolines to a dense array of nanolines. In addition to these unique structural characteristics, scanning tunnelling microscopy and density functional theory reveal a one-dimensional state confined along the Haiku core. This nanoline is a promising candidate for the long sought after electronic solid-state one-dimensional model system to explore the fascinating quantum properties emerging in such reduced dimensionality. Phys. Rev. B, 84, 035328 (2011)

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