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STM Characterization of Si Surface Functionalized with Organic Layers HONGBIN YU, LAUREN WEBB, PEIGEN CAO, SANTIAGO SOLARES, RYAN RIES, WILLIAM GODDARD III, NATHAN LEWIS, JAMES HEATH, California Institute of Technology — High quality, high density Si nanowires can be used for making high density memory and logic circuits, and for biomolecule sensing when nanowires are selectively functionalized. An important step towards successful functionalization of Si wires is to control and understand the covalently bound monolayer of hydrocarbon molecules onto a silicon surface. Low temperature scanning tunneling microscopy (STM) data have been obtained on a series of alkyl group-terminated crystalline Si(111) surfaces that were prepared through a two-step chlorination/alkylation technique. The data from CH_3-terminated surface revealed a well-ordered structure commensurate with the atop sites of an unreconstructed 1x1 overlayer on the silicon (111) surface. Images collected at 4.7 K revealed bright spots, separated by 0.18 $\pm$ 0.01 nm, which are assigned to adjacent H atoms on the same methyl group. The orientation of the methyl group with respect to the Si lattice can subsequently be determined as well as the interactions among different surface species. Ethyl- terminated Si surface will also be discussed.

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