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Aqueous Etching Produces Si(100) Surfaces of Near-atomic Flatness BRANDON S. ALDINGER, ANKUSH GUPTA, IAN T. CLARK, MELISSA A. HINES, Cornell University — The production of atomically flat Si(100) surfaces is a long-standing technological challenge, as these surfaces are the basis for today's microelectronic devices. We use a combination of STM and vibrational spectroscopy to show that a simple aqueous etch can produce Si(100) surfaces of suprising and unprecedented smoothness. The etched surfaces are characterized by long rows of H-terminated Si atoms. The chemical origins of this perfection are uncovered, in part, by a new polarization-based, spectral deconvolution technique that significantly simplifies the analysis of the well-know H/Si(100) vibrational spectrum. Kinetic Monte Carlo simulations yield further insights into the site-specific chemical reactions that govern the steady-state etch morphology. The effects of interadsorbate stress, etchant pH, and gas evolution will also be discussed as time permits.

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