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Evolution of Si Surface Morphology under Oxygen Etching[1] ALISON BASKI, Virginia Commonwealth University, MARY WILLIS, Virginia Commonwealth University, JONATHAN DICKINSON, Georgetown College — We have studied the surface morphologies produced after oxygen etching of the following Si surfaces: (001), (111), (113), (5 5 12), and (112). Atomic force microscopy data show the evolution of the surface morphology as a function of dosage (50 to 400 Langmuirs) for sample temperatures from 700 to 900 $^{\circ}$C and a pressure of 3x10^{-7} Torr. We have found that certain orientations are relatively stable against extended etching, whereas others are unstable and produce faceted morphologies. The (001), (111), and (113) surface orientations are stable and produce morphologies composed of terraces with islands caused by etching around oxide-induced pinning sites. As expected, the island density decreases as temperature increases, yielding an effective activation energy of 2 to 4 eV. High-index surfaces such as (5 5 12) and (112), however, are unstable against extended etching and produce faceted sawtooth morphologies. These sawtooths are aligned along the [$\underline{1}$10] direction and are primarily composed of the more stable (111) and (113) planes. Further studies are in progress to determine if steady-state morphologies exist at dosages above 1000 Langmuirs.

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