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Chemical Nanomachining of Si JEREMY ROBINSON, University of California-Berkeley, Berkeley, CA 94720, PAUL EVANS, University of Wisconsin-Madison, Madison, WI 53706, J. ALEX LIDDLE, Lawrence Berkeley National Laboratory, Berkeley, CA 94720, OSCAN DUBON, University of California-Berkeley, Berkeley, CA 94720 — We demonstrate a simple process for chemical nanomachining of reproducible Si nanonstructures. Using a stencil mask containing windows of various geometries, we evaporate Au onto a Si surface rinsed in HF. The pattern formed by the spontaneous oxidation of Si at and around each patterned Au feature serves as a mask for the underlying Si and permits the use of simple wet chemistry to produce highly ordered nanostructures of diverse shapes including rings, pillars, wires, and nanopores. Pillars are formed by etching a Si sample patterned with an array of nominally 1 nm-thick Au squares having a side dimension of 200 nm. Remarkably, the Au capped core of these pillars can be removed by briefly rinsing the Au-patterned sample with HF prior to etching with KOH. When the Au-squares are sufficiently close together, the anodic oxide patterns surrounding the Au squares overlap to form a continuous surface oxide. Etching in this case with HF followed by KOH produces a continuous Si film with holes. Thus, this unique catalyzed patterning process opens the door for the rapid, parallel fabrication of a variety of nanostructures that are unfeasible or impractical to fabricate with traditional processing routes.

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