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Highly Ordered Arrays of Silicon Nanostructures Fabricated by Reactive Ion Etching and Atomic Fluorine Etching MARK CURTIS, PRESTON LARSON, KEVIN HOBBS, MARK KEIL, MATTHEW JOHNSON, HOMER L. DODGE DEPARTMENT OF PHYSICS AND ASTRONOMY, UNIVERSITY OF OKLAHOMA, NORMAN, OK 73019 TEAM — High density arrays of conical nanostructures have been fabricated in silicon using a combination of anodic aluminum oxide (AAO) templating and dry etching techniques. Optically, such structures appear black, indicating strong optical absorption. Such structures have applications associated with field emitters and photo-voltaic cells. Silicon directly exposed to an atomic fluorine beam yields an array of sharp silicon spikes. Using the AAO template as a mask with the fluorine beam or reactive ion etcher (RIE) results in highly ordered arrays of nanostructures. In particular, the RIE samples have conical silicon nanostructures, approximately 150 nm in height. These nano-cones are arranged in a honeycomb pattern with a center-to-center spacing of approximately 100 nm and exhibit a high degree of ordering over micron by micron areas. Characterization of these nanostructures was carried out by scanning electron microscopy and various optical techniques.

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