

## SILICON NANOSTRUCTURES FORMATION BY V<sub>2</sub>O<sub>5</sub> AND HF STAIN ETCHING

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### **Abstract**

In recent years, much effort has been devoted to the manufacture of one dimensional nanostructured materials for application in micro and nanodevices. Silicon is the basic material in microelectronics, and in recent years, low dimensional silicon structures like nanowires and nanopillars are object of extensive studies. Both of these nanostructures have attracted much attention for their application as nanoscale biosensors. Recently, Metal Assisted Etching and vanadium oxide stain etching have renewed the attention towards these chemical methods of nanostructures fabrication [1].

In this work we report the fabrication of silicon pillar array by a simple chemical etching of silicon in vanadium oxide/fluorhydric acid solution. Different etching parameters including the solution concentration, temperature and orientation of Si substrates and thin metal catalyst film deposition (Pd) on the Si surface were studied. The etched surfaces characterized by Scanning Electron Microscopy are shown in fig.1. It has been found that the morphology depends on both etching time and the presence of the catalyst. The results show a different morphology in each case. As shown in the figure below, the attack, on the surfaces with a Palladium deposit, begins by creating circular pores on silicon in which we distinguish the formation of nanopillars of silicon. After several minutes of etching, silicon pillars appear, but the morphology seems strongly conditioned by drying, like in metal assisted etched SiNWs and highly porous silicon. Finally, taking into account the obtained results, a mechanism of the chemical etching is proposed.

### **References:**

[1] Li & Bohn, Chartier, Kurt Kolasinsky, *J. Phys. Chem. C*, 2010, 114 (50), pp 22098–22105