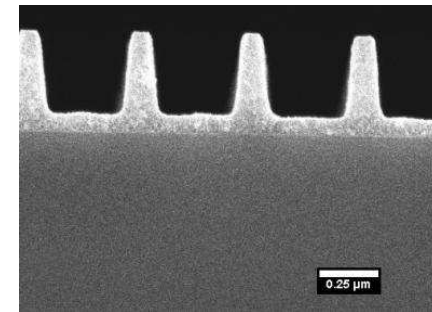
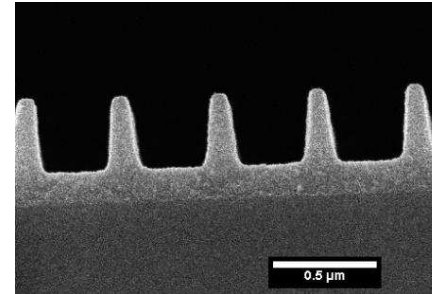


Direct Printing of Crystalline Metal Oxide Device Structures

A key challenge for printed and flexible devices is competing with the performance of inorganic devices produced using conventional wafer based fabrication tools. CHM researchers have developed a new process that involves nanoimprint patterning of inks based on crystalline metal oxide nanoparticles and small amounts of sol-gel type metal oxide precursors. Pattern resolution of less than 250 nm is possible. Because the inks are comprised predominantly of crystalline materials, there is little shrinkage during post-patterning processing, including annealing up to 800 °C. The CHM is now working on pulse flash lamp cure technology to make the process compatible with thermally sensitive substrates and on transitioning the approach to roll-to-roll production.



Professor James Watkins University of Massachusetts



Figures: SEM images of directly patterned crystalline metal oxide films before (top) and after (bottom) high temperature annealing. The structures have not been etched. This technique provides a method for printing sub-250 nm features with excellent dimensional control. The Center is working on scaling the process using its R2R tools such as the one shown at left.