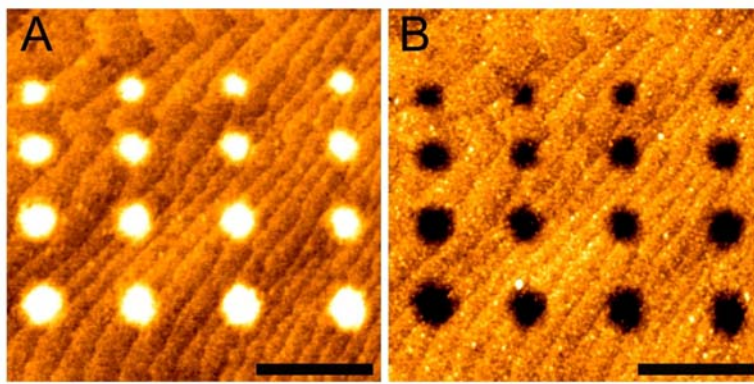


#### 4.1.3 LIQUID PHASE NANOLITHOGRAPHY (LPN)

C. R. Kinser, M. J. Schmitz, M. C. Hersam, "Conductive Atomic Force Microscope Nanopatterning of Hydrogen-Passivated Silicon in Inert Organic Solvents," *Nano Lett.*, **2005**, *5*, 91-95.

Liquid phase nanolithography (LPN) allows surface chemistry to be patterned with nanometer scale spatial resolution using conductive atomic force microscopy (CAFM). In particular, by applying a bias between the CAFM tip and the sample in a liquid environment, electrochemical reactions can be spatially localized on the sample surface. The figure illustrates LPN being performed on a silicon surface in an inert organic solvent environment. Since the resulting nanopatterned regions are chemically distinct from the remainder of the surface, subsequent chemistry can be performed selectively on the nanopatterns. In this manner, LPN enables a variety of applications ranging from nanoscale biological and chemical sensors to nanoelectronic devices.



(A) An array of nanostructures patterned with liquid phase nanolithography (LPN) on a silicon surface in an inert organic solvent environment. The scale bar is 250 nm. (B) Following a subsequent chemical treatment, the LPN nanostructures are preferentially etched, thus reversing the contrast in this atomic force microscope image. This result demonstrates that chemistry can be selectively performed on LPN nanopatterns.