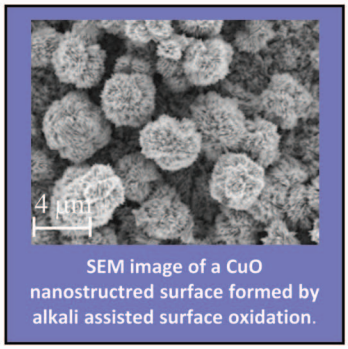
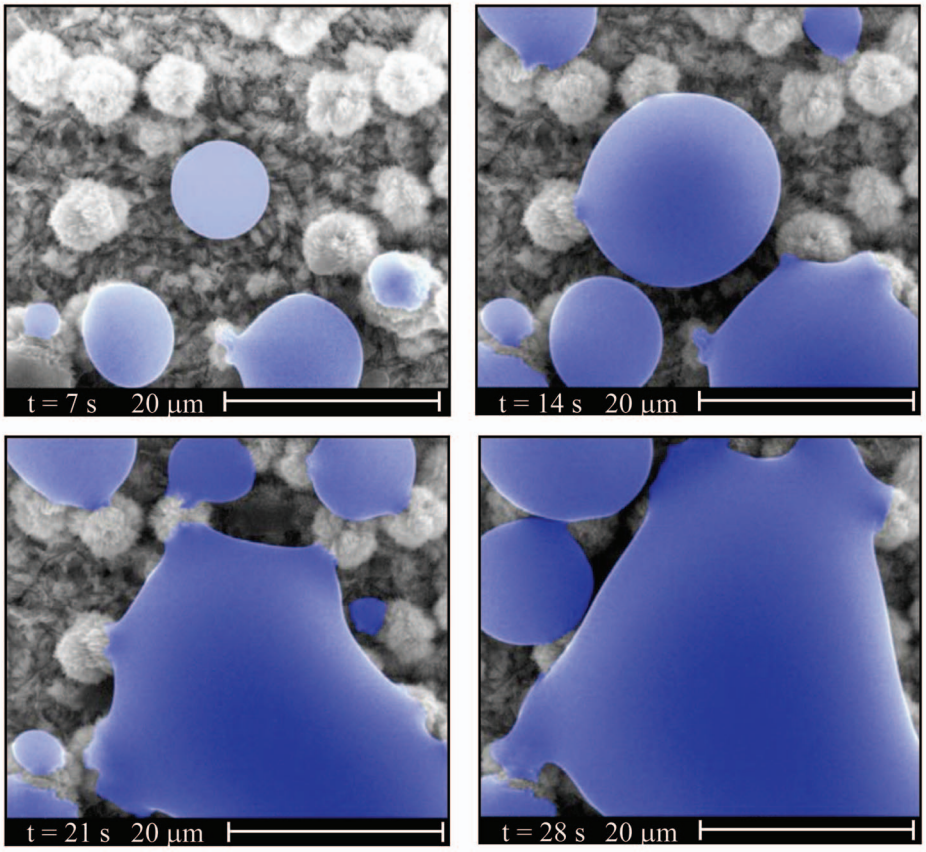


SEM image of a CuO nanostructred surface formed by alkali assisted surface oxidation.



ESEM Imaging of Condensation on a Nanostructured Superhydrophobic Surface

C. Dietz, K. Rykaczewski, A. Fedorov, and Y. Joshi

Woodruff School of Mechanical Engineering, Georgia Institute of Technology, Atlanta, GA 30332

Environmental SEM images of water vapor at 5 Torr condensing on a CuO superhydrophobic surface held at 0°C. The drop growth, pinning on the surface, and coalescence is depicted in this series of images. The flower-like, CuO nanostructures, consisting of a ~3 μm diameter bud and ~200 nm thick petals, are formed by immersing copper into a solution of 2.5 M NaOH and 0.1 M $(NH_4)_2S_2O_8$. The self assembled nanostructures are then functionalized with a fluorinated polymer. The result is a superhydrophobic surface (a surface in which the contact angle is greater than 150°).

Condensation on a superhydrophobic surface may lead to a permanent increase in the heat transfer coefficient. By using an environmental SEM and a Peltier stage, high resolution images of water vapor condensing on these surfaces is visualized. Due to drop pinning on the structures, the drops are not spherical after coalescence. As a result, the surface tends to be wetted by the condensate, bringing in to question whether superhydrophobic surfaces are still superhydrophobic under ESEM operating conditions.

