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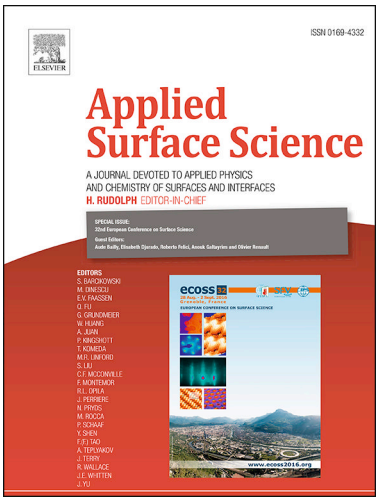

Full Length Article

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Revealing multimode resistive switching in Cu-O nanostructures using conductive atomic force microscopy

Mohit Kumar,[1,2,†] Biswarup Satpati,[2,3] and Tapobrata Som[1,2,*]

[1]*SUNAG Laboratory, Institute of Physics, Sachivalaya Marg, Bhubaneswar 751 005, India*

[2]*Homi Bhabha National Institute, Training School Complex, Anushakti Nagar, Mumbai 400 085, India*

[3]*Surface Physics and Materials Science Division, Saha Institute of Nuclear Physics, 1/AF Bidhannagar, Kolkata 700 064, India*

Abstract

We demonstrate the nanoscale multimode resistive switching in copper oxide nanostructures using conductive atomic force microscopy (cAFM). The cross-sectional transmission electron microscopy (XTEM) and scanning tunnelling electron microscopy – high angle angular dark field (STEM-HADDF) imaging confirms the formation of Cu-O nanostructures. In addition, x-ray photoelectron spectroscopy (XPS) is used to study the chemical composition of Cu-O nanostructures. Current-voltage characteristics measured by conductive atomic force microscopy (cAFM) reveals that the filament forms in multistep processes, instead the rapid one, indicating the multimode resistive switching. The presence of multimode RS is corroborated to the defect-induced conduction mechanism across the Cu-O nanostructures. The present study should open up a new avenue to understand the conduction mechanism and to design an advanced nanoscale device.

*Author to whom correspondence should be addressed; E-mail: tsom@iopb.res.in

†Present address: *Department of Electrical Engineering, Incheon National University, 119 Academy Rd. Yeonsu, Incheon, 406772, Republic of Korea*