Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Mott transition and Schottky barrier observation by photocurrent measurement in VO_2 devices GIWAN SEO, Metal-Insulator Transition Creative Research Center, ETRI, Korea, MINJUNG KIM, Department of Physics, Sogang University, Korea, BONG-JUN KIM, Metal-Insulator Transition Creative Research Center, ETRI, Korea, YONG WOOK LEE, School of Electrical Engineering, Pukyong National University, Korea, AHRUM SOHN, DONG-WOOK KIM, Department of Physics, Ewha Womans University, Korea, HYEON-SIK CHEONG, Department of Physics, Sogang University, Korea, HYUN-TAK KIM, Metal-Insulator Transition Creative Research Center, ETRI, Korea — As one of the metal-insulator transition (MIT) mechanism, the Mott transition occurs due to Coulomb interactions of electrons in VO_2. This suggests that VO_2 does not undergo the structural phase transition (SPT) when MIT occurs. For observing the Mott transition and Schottky barrier in VO_2 devices, we simultaneously observe the temperature dependence of photocurrent and local structural observation in the two-terminal VO_2 devices by using scanning photocurrent microscopy, which is a typical method for showing images of nanometer-length scale and Raman spectroscopy, respectively. In particular, the photocurrent between two electrodes through VO_2 channel increases due to the variation of schottky barrier height. Furthermore, the work functions of VO_2 thin film is investigated while varying the device temperature, which could assure the Schottky contact formation. We also find the metallic phase with monoclinic structure below a conventional transition temperature of VO_2 ($\sim$ 68 °C), indicating the Mott transition of VO_2.

Giwan Seo
ETRI

Date submitted: 13 Nov 2013 Electronic form version 1.4