Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

First-order metal-insulator transition not accompanied by the structural phase transition observed in VO_2-based devices HYUN-TAK KIM, BYUNG-GYU CHAE, BONG-JUN KIM, YONG-WOOK LEE, SUN-JIN YUN, KWANG-YONG KANG, ETRI in Korea — An abrupt first-order metal-insulator transition (MIT) is observed during the application of a switching pulse voltage to VO_2-based two-terminal devices. When the abrupt MIT occurs, the structural phase transition (SPT) is investigated by a micro- Raman spectroscopy and a micro-XRD. The result shows that the MIT is not accompanied with the structural phase transition (SPT); the abrupt MIT is prior to the SPT. Moreover, any switching pulse over a threshold voltage of 7.1 V for the MIT enabled the device material to transform efficiently from an insulator to a metal. The measured delay time from the source switching pulse to an induced MIT pulse is an order of 20 nsec which is much less than a delay time of about one msec deduced by thermal model. This indicates that the first-order MIT does not occur due to thermal. We think this MIT is the Mott transition. (Reference: New J. Phys. 6 (1994) 52 (www.njp.org), Appl. Phys. Lett. 86 (2005) 242101, Physica B 369 (2005. December) xxxx)

Hyun-Tak Kim
ETRI in Korea

Date submitted: 10 Nov 2005 Electronic form version 1.4