Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

The field-effect in vanadium dioxide and the metal-insulator transition[1] KOEN MARTENS, IBM Almaden / ESAT-KULeuven / imec, JAE-WOO JEONG, IBM Almaden / UC Santa Barbara, NAGAPHANI AETUKURI, IBM Almaden / Stanford University, CHARLES RETTNER, LI GAO, BRIAN HUGHES, KEVIN ROCHE, MAHESH SAMANT, S.S.P. PARKIN, IBM Almaden
— VO_2 and its metal-insulator transition are currently of interest to enhance understanding of metal-insulator transitions and for investigating possible applications in nanoelectronic devices. Inducing the metal-insulator transition by means of an electric field, instead of by changing the temperature, could entail a major enhancement of present-day nano-electronics. Both the field induced metal-insulator transition and the regular semiconductor field-effect are investigated in this work using monocrystalline VO_2 field-effect structures. The field dependent VO_2 conduction characteristics across the metal-insulator transition are elucidated. The relation of these VO_2 characteristics with the VO_2-insulator interface is clarified by means of admittance analysis.

[1]Acknowledged: FWO

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Date submitted: 09 Nov 2012 Electronic form version 1.4