Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

High T_{IMT} insulator-to-metal transition of the VO_2 films on AlN/Si substrate. TETIANA SLUSAR, JIN-CHEOL CHO, BONG-JUN KIM, HYUN-TAK KIM, MIT Center in ETRI — Electronical and structural properties of the VO_2 thin films are strongly affected by growth conditions and underlying substrate providing a flexibility of their functional parameters. We present a new VO_2/AlN/Si heterostructure, where VO_2 is characterized by an excellent insulator-to-metal transition (IMT) occurred at a higher temperature T_{IMT} than that typical for single crystals. Mentioned characteristics are associated with growth mechanism of the film and its epitaxial alignment with respect to the substrate. In particular, the T_{IMT} upshift in VO_2/AlN/Si is explained by a stable crystallographic configuration in the plane of the VO_2 film as well as a tensile deformation of a monoclinic a-axis formed by tilted and dimerized V^{4+}-V^{4+}, responsible for strong electron correlations. Moreover, proposed synergy of VO_2 and Si is able to make new results for advanced materials fabrication and development of switching devices of new generation.

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Date submitted: 06 Nov 2015 Electronic form version 1.4