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Coherently Coupled ZnO and VO_2 Interface studied by Photoluminescence and electrical transport across a phase transition AMAR SRIVASTAVA, S. SAHA, A. ANNADI, Y.L. ZHAO, K. GOPINADHAN, X. WANG, N. NAOMI, Z.Q. LIU, S. DHAR, NUSNNI-NanoCore, National University of Singapore, Singapore, T.S. HERNG, BAO NINA, Department of Mat. Sci. and Eng, National University of Singapore, Singapore, - ARIANDO, NUSNNI-NanoCore, National University of Singapore, Singapore, JUN DING, Department of Mat. Sci. and Eng, National University of Singapore, Singapore, T. VENKATESAN, NUSNNI-NanoCore, National University of Singapore, Singapore — In this work we report a study of a coherently coupled interface consisting of a ZnO layer grown on top of an oriented VO_2 layer on sapphire by photoluminescence and electrical transport measurements across the VO_2 metal insulator phase transition (MIT). The photoluminescence of the ZnO layer showed a broad hysteresis induced by the phase transition of VO_2 while the width of the electrical hysteresis was narrow and unaffected by the over layer. The enhanced width of the PL hysteresis was due to the formation of defects during the MIT as evidenced by a broad hysteresis in the opposite direction to that of the band edge PL in the defect luminescense. Unlike VO_2 the defects in ZnO did not fully recover across the phase transition. From the defect luminescence data, oxygen interstitials were found to be the predominant defects in ZnO mediated by the strain from the VO_2 phase transition. Such coherently coupled interfaces could be of use in characterizing the stability of a variety of interfaces and also for novel device application.

Ariando .
NUSNNI-NanoCore, National University of Singapore, Singapore

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