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Distinct Electronic Structure of the Electrolyte Gate Induced Conducting Phase in VO_2 Revealed by Photoelectron Spectroscopy
JULIE KAREL, CARLOS VIOL BARBOSA, JANOS KISS, Max-Planck-Institut für Chemische Physik fester Stoffe, Dresden, Germany 01187, JAEWOO JEONG, NAGAPHANI AETUKURI, MAHESH SAMANT, IBM Almaden Research Center, San Jose, California, USA 95120, XENIA KOZINA, EIJI IKENAGA, Japan Synchrotron Radiation Research Institute, SPring-8, Hyogo, Japan 679-5148, GERHARD FECHER, CLAUDIA FELSER, Max-Planck-Institut für Chemische Physik fester Stoffe, Dresden, Germany 01187, STUART PARKIN, IBM Almaden Research Center, San Jose, California, USA 95120 — Vanadium dioxide (VO_2), a strongly correlated material, exhibits a temperature-driven metal to insulator transition (MIT), which is accompanied by a structural transformation from rutile (high-temperature metallic phase) to monoclinic (low-temperature insulator phase). Recently, it was discovered that a low-temperature conducting state emerges in VO_2 thin films upon gating with a liquid electrolyte. In this talk, photospectroscopy measurements of the core electronic states and valence band of electrolyte gated VO_2 thin films will reveal electronic features in the gate-induced conducting phase that are distinct from those of the temperature-induced rutile metallic phase. The electronic characteristics of the gated metallic state can be accounted for by oxygen vacancy formation and a consequent reduction in V-V dimerization without lifting the orbital ordering. An electronic bandstructure taking into account these modifications will be discussed.

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