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Electronic structure of strained vanadium dioxide thin films using soft X-ray spectroscopy JUDE LAVEROCK, LOUIS PIPER, ANDREW PRESTON, BO CHEN, JAMES MCNULTY, KEVIN SMITH, Boston University, SALINPORN KITTIWATANAKUL, JIWEI LU, STUART WOLF, University of Virginia — Despite over five decades of intense investigation, the origin of the metal-insulator transition (MIT) in VO_2 still presents a challenge to explain. Whether the lattice (Peierls physics) or electron-electron correlations (Mott-Hubbard physics) are responsible for the MIT has been hotly debated; more recently, the general consensus has favored a co-operative description, in which both structural and correlation effects are important and sympathetic to the transition. Key to understanding such a co-operative picture has been the behavior of VO_2 under doping and strain. Here, we report recent soft X-ray measurements of strained VO_2 thin films grown on TiO_2(001) and (110) substrates. We employ X-ray absorption spectroscopy and X-ray emission spectroscopy to probe the changes in both the *unoccupied* and *occupied* partial density of states across the MIT, observing distinct changes in the V 3d-O 2p hybridization. Additionally, the location in energy of the unoccupied $d_{\|}$ state in the insulating phase is found to be dependent on the lattice strain, in agreement with the predictions of recent dynamical mean-field theory calculations. Finally, our results are discussed in the context of the origin of the MIT in VO_2.

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