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Strain-dependent Metal-Insulator Tansition in VO_2 single-crystalline thin films NAGA PHANI AETUKURI, Stanford University/IBM Almaden Research Center, ALEXANDER GRAY, SLAC National Accelerator Laboratory, MATTEO COSSALE, MARC DROUARD, LI GAO, IBM Almaden Research Center, HERMANN DURR, SLAC National Accelerator Laboratory, MAHESH SAMANT, STUART PARKIN, IBM Almaden Research Center — Vanadium dioxide (VO_2 has a near room temperature metal insulator transition ($T_{MIT} \sim 340$ K) accompanied by a structural transition making the origin of this transition controversial. In this work, we have continuously changed T_{MIT} by as much as 60 K in VO_2 (001) single crystalline thin films by using RuO_2 buffer layers. We observe a decrease in the T_{MIT} as a function of decreasing c-axis length in the rutile phase which is unexpected from a one-dimensional Peierls model. By performing complementary bulk-sensitive spectroscopic measurements, namely, x-ray absorption spectroscopy (XAS) and x-ray photoelectron spectroscopy (XPS), we identify changes in orbital occupation and electron-electron correlations as a function of strain in the metallic state that explain the observed T_{MIT} dependence on strain.

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