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Strain tuning of a Metal-Insulator Transition in $SrVO_3$ films

ELAS FERREIRO-VILA, HUGO MELEY, MARTA GIBERT, ZHENPING WU, STEFANO GARIGLIO, JEAN-MARC TRISCONE, Univ of Geneva, TRISCONE GROUP TEAM — $SrVO_3$ is a $3d^1$ metal with cubic perovskite structure in bulk. Ultrathin films, however, display a dimensional-crossover-driven Metal-Insulator Transition (MIT) as measured by *in situ* photoemission spectroscopy [1]; the ground state for 2 unit cell thick layers is of Mott-Hubbard nature, i.e. the insulating state seems to be driven by electronic correlations, probably enhanced by the reduced dimensionality. Dynamical mean field theory (DMFT) calculations show that this MIT is very sensitive to small changes in the level of epitaxial strain and in thickness [2] making ultrathin $SrVO_3$ films interesting for applications such as sensors and Mott transistors.We report here on investigations of high quality epitaxial films of $SrVO_3$ grown on a variety of substrates imposing different lattice mismatches. Our transport measurements revealed that the thickness-driven MIT can indeed be tuned via epitaxial strain. As the film thickness is reduced, the films evolve from a metallic behavior to a localized one. At intermediate film thickness, an upturn in resistivity is observed at low temperatures. The thickness at which the crossover occurs depends on the level of strain. [1] K.Yoshimatsu, T. Okabe, H. Kumigashira, S. Okamoto, S. Aizaki, A. Fujimori and M. Oshima. *PRL* **104,** 147601 (2010). [2]Z. Zhong, M. Wallerberger, J. M. Tomczak, C. Taranto, N. Parragh, A. Toschi, G. Sangiovanni and K. Held, *PRL* **114**, 246401 (2015).

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