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**Mapping the spatial scale of domain switching in heteroepitaxial vanadium dioxide thin films and nanoparticles**[1] JOYEETA NAG, RICHARD HAGLUND, Vanderbilt University — Vanadium dioxide is a strongly correlated electron system exhibiting a hysteretic semiconductor-to-metal transition around 67C, accompanied by a structural change from monoclinic to tetragonal and huge changes in its electrical conductivity and near-infrared transmission. As interest grows in very thin films and nanoparticles of vanadium dioxide, the spatial scale and domain structure of the metal-insulator transition are critical issues. To elucidate these questions, thin films and nanoparticles of vanadium dioxide were grown on R-, C- and A-cut sapphire substrates, and the substrate-dependent epitaxial growth habits and in-and-out-of-plane orientations were characterized by near-infrared transmission, X-ray diffraction, scanning and transmission electron microscopy. Temperature variable XRD scans at intervals of one degree were performed from the onset to the completion of the transition hysteresis to map out the percentage of coexisting domains of monoclinic and tetragonal phases in one such 100nm thick epitaxial film.

[1]Portions of this work were carried out at the CNMS and SHaRE facilities, Oak Ridge National Laboratory

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