

Structural phase transition and electronic structure of epitaxial VO₂ thin films prepared on a-Al₂O₃ substrate

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Epitaxial thin films of thermochromic VO₂ were prepared on a-Al₂O₃ substrate using pulsed laser deposition (PLD) technique. Temperature dependent structural and electronic properties of the prepared epitaxial VO₂ thin films were studied by synchrotron X-ray diffraction (XRD) and X-ray absorption measurements. Temperature dependent synchrotron XRD measurements revealed the monoclinic to rutile structural phase transition (SPT) near 68°C in epitaxial VO₂ thin films of different thickness (Fig. 1). A thermal hysteresis observed in the SPT during heating and cooling cycle signify the first order phase transition. Temperature dependent X-ray absorption linear dichroism (XLD) measurements at V *L*-edge and O *K*-edge; were carried out to examine the electronic structure of epitaxial VO₂ thin films. The modification in the electronic structure of epitaxial VO₂ thin films across the insulating monoclinic to metallic rutile phase transition were tracked.

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