Abstract Submitted
for the SES07 Meeting of
The American Physical Society

Heteroepitaxial Growth and Phase Transition Properties of Vanadium Dioxide Thin Films JOYEETA NAG, EUGENE DONEV, JAE SUH, LEONARD FELDMAN, RICHARD HAGLUND, Vanderbilt University — Vanadium dioxide thin films were deposited on R(012) and C(001) planes of sapphire and titanium dioxide substrates using pulsed laser deposition. Growth conditions were optimized to obtain epitaxial growth of films up to 100 nm thick. As is typical for oxide thin films, oxygen pressure and temperature are the main parameters governing the formation of the well-known VO_2 phase that exhibits the semiconductor-to-metal transition near 68°C. A systematic study of the optical transmission and reflection in the near-infrared was done as a function of temperature between 20°C and 90°C. The samples were analyzed by X-ray diffraction, ion-beam channeling and scanning electron microscopy in order to determine epitaxy and crystal quality. The results show that the growth of VO_2 has strong substrate dependence. Tungsten doping of the epitaxial VO_2 films was also carried out in order to lower the phase transition temperature and lattice locations of the dopant atoms were determined.

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Date submitted: 17 Aug 2007 Electronic form version 1.4