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Growth and Characterization of Vanadium Dioxide Thin Films for Application in Tunable Metasurfaces ELISE MOORE, NATHAN KURTZ, ADAM OLLANIK, BRIAN RIGGS, MATTHEW ESCARRA, Tulane Univ — Vanadium dioxide (VO2) demonstrates dramatic variation in optical and electronic properties across a metal-insulator transition. The transition, which occurs near room temperature, involves a phase change from monoclinic to tetragonal crystal structure. In order to utilize its unique properties in tunable optical metasurfaces, VO2 thin films are grown using pulsed laser deposition (PLD) on amorphous glass substrates. Raman scattering spectroscopy, x-ray diffraction, and other characterization of the phase transition are used to assess their quality. The most straightforward characterization is done by measuring the resistivity change of a film across the transition temperature (68C). The magnitude of this change is a direct measure of film quality. Electrical characterization of the phase transition is verified and complemented by optical characterization – analysis of the film's reflectance, transmittance, and refractive index as a function of temperature. These films are then employed in low-loss Huygens optical metasurfaces, which use tunable phase shift in nanoresonators to vary the behavior of light across an interface via a thermal, electrical, or optical stimulus.

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