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Ultrafast Spectroscopy and Optically-Induced Phase Transitions of Single Crystal VO₂¹ AARON JONES, JAE PARK, JIM COY, DAVID COBDEN, XIAODONG XU, University of Washington — We investigate the metal-insulator phase transition (MIT) of single crystal VO₂ platelets using non-degenerate optical pump-probe spectroscopy. The pump pulse is at 800 nm and the probe pulse varies between 1.3 μm and 2.4 μm , covering the optical gap ($\sim 2 \mu\text{m}$) of VO₂. We observe ultrafast carrier relaxation on the timescale of 0.5 ps or less in the insulating phase. Higher pump powers induce coherent acoustic phonon oscillations which we explore by adjusting probe wavelength and pump fluence. At temperatures just below the transition, we observe optically induced MIT at a time scale less than 300 fs (pulse width limited), and we investigate the dependence on crystal size, wavelength, and temperature. The properties of the insulator do not seem consistent with a conventional band semiconductor.

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