Abstract Submitted
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New Insights into the Diverse Electronic Phases of a Novel Vanadium Dioxide Polymorph: A Terahertz Spectroscopy Study[1] JAMES LOUREMBAM, Nanyang Technological University, AMAR SRIVASTAVA, National University Singapore, CHAN LA-O-VORAKIAT, Nanyang Technological University, HELENE ROTELLA, THIRUMALAI VENKATESAN, National University Singapore, ELBERT CHIA, Nanyang Technological University — A remarkable feature of vanadium dioxide is that it can be synthesized in a number of polymorphs. The conductivity mechanism in the metastable layered polymorph $VO_2(B)$ thin films has been investigated by terahertz time-domain spectroscopy (THz-TDS). In $VO_2(B)$, a critical temperature of 240 K marks the appearance of a non-zero Drude term in the observed complex conductivity, indicating the evolution from a pure insulating state towards a metallic state. In contrast, the THz conductivity of the well-known $VO_2(M1)$ is well fitted only by a modification of the Drude model to include backscattering. We also identified two different THz conductivity regimes separated by temperature in these two polymorphs. The electronic phase diagram is constructed, revealing that the width and onset of the metal-insulator transition in the B phase develop differently from the $M1$ phase.

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