Abstract Submitted
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Thickness and substrate dependence of the optical conductivity of niobium dioxide films.[1] D. J. LAHNEMAN, ZHEN XING, MITCHELL POLIZZI, MELISSA BEEBE, R. A. LUKASZEW, M. M. QAZILBASH, Department of Physics, College of William and Mary, S. KITTIWATANAKUL, J. LU, S. A. WOLF, Department of Material Sciences and Engineering, University of Virginia — Niobium dioxide (NbO_2) undergoes a temperature induced insulator-to-metal transition accompanied by a crystallographic transition at ~1080K. Films of different thickness (100 nm and 200 nm) were grown directly on sapphire substrates and on gold coated sapphire substrates. Using Fourier transform infrared spectroscopy and spectroscopic ellipsometry we investigate the room temperature insulating state of NbO_2 thin films in the spectral range from ~100 cm^{-1} to 50000 cm^{-1}. We observe that at ~25000 cm^{-1} there is a shift in the optical interband transition for different films. We discuss the origin of this shift and the implications for the electronic structure. We compare the infrared-active phonons in NbO_2 films with those published in the literature on single crystals. The phonons shed light on the strain in the films.

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