

Abstract Submitted  
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**Observation of interacting polaronic gas behavior in Ta-doped TiO<sub>2</sub> thin films via terahertz time-domain spectroscopy<sup>1</sup>** ELBERT CHIA, LIANG CHENG, JAMES LOUREMBAM, S. G. WU, Nanyang Technological Univ, MALLIKARJUNA R. MOTAPOTHULA, TARAPADA SARKAR, VENKY VENKATESAN, National Univ Singapore — Using terahertz time-domain spectroscopy (THz-TDS), we obtained the complex optical conductivity [ $\tilde{\sigma}(\omega)$ ] of Ta-doped TiO<sub>2</sub> thin films — a transparent conducting oxide (TCO), in the frequency range 0.3–2.7 THz, temperature range 10–300 K and various Ta dopings. Our results reveal the existence of an interacting polaronic gas in these TCOs, and suggest that their large conductivity is caused by the combined effects of large carrier density *and* small electron-phonon coupling constant due to Ta doping.

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