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Mott transition in vanadium dioxide (VO$_2$) observed by infrared spectroscopy and nano-imaging$^1$ M.M. QAZILBASH, G.O. ANDREEEV, D.N. BASOV, P.-C. HO, M.B. MAPLE, Physics Department, University of California - San Diego, M. BREHM, F. KEILMANN, Abt. Molekulare Strukturbioalogie, Max-Planck-Institut für Biochemie and Center for NanoScience, A. V. BALATSKY, Theoretical Division and Center for Integrated Nanotechnologies, Los Alamos National Laboratory, BYUNG-GYU CHAE, BONG-JUN KIM, SUN JIN YUN, HYUN-TAK KIM, IT Convergence And Components Lab, ETRI, Daejeon, Korea — The driving mechanism for the temperature-induced insulator-to-metal transition (IMT) in vanadium dioxide (VO$_2$) has been debated for the past five decades. Central to this debate is the relative importance of electron-electron correlations and charge-ordering to the IMT. We report near-field infrared images of VO$_2$ films that directly show the percolative IMT. In combination with far-field infrared spectroscopy, the new data reveal the Mott transition with divergent optical mass in the metallic puddles that emerge at the onset of the IMT.

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