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Local thermal heating in VO_2 electric-field-induced metal insulator transition A. ZIMMERS, L. AIGOUY, Laboratoire de Physique et d'Etude des Materiaux (LPEM), ESPCI-ParisTech-UPMC-CNRS, Paris, France, A. SHARONI, Dept. of Physics and Institute of Nanotechnology, Bar Ilan University, Ramat Gan, Israel, S. WANG, Department of Physics and Materials Science and Engineering and Center for Advanced Nanoscience, UCSD, La Jolla, CA, USA, J.G. RAMIREZ, Department of Physics and Center for Advanced Nanoscience, UCSD, La Jolla, CA, USA, I.K. SCHULLER, Department of Physics and Materials Science and Engineering and Center for Advanced Nanoscience, UCSD, La Jolla, CA, USA — Over recent years, the insulator to metal transition (IMT) of the vanadium dioxide (VO_2) Mott insulator has been revisited revealing an electric-field-induced resistance switching. Whether this feature is purely due to an electrical field effect or due to some Joule heating is still under debate. Here we report a local temperature measurement in a 10μm and a 20μm VO_2 junction while going through the resistance switching. The sample was placed at ΔT=15K below 340K (the thermally induced insulator to metal transition). When ramping up the voltage across the junction we find that the local heating inside the VO_2 junction is close to 15K. This data suggests that in these temperature, current and voltage ranges, the field induced IMT can be explained by local Joule heating. Work supported by the French ANR-09-BLAN-0388-01 and the US DOE and AFOSR.

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