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A microscopic view on the Mott transition in chromium-doped V_2O_3 G. SANGIOVANNI, Institute of Solid State Physics, Vienna University of Technology, Austria, S. LUPI, L. BALDASSARRE, D. NICOLETTI, M. MARSI, P. HANSMANN, N. PARRAGH, A. TOSCHI, T. SAHA-DASGUPTA, O.-K. ANDERSEN, K. HELD — V_2O_3 is the prototype system for the Mott transition, one of the most fundamental phenomena of electronic correlation. Temperature, doping or pressure induce a metal-to-insulator transition (MIT) between a paramagnetic metal (PM) and a paramagnetic insulator. This or related MITs have a high technological potential, among others, for intelligent windows and field effect transistors. However the spatial scale on which such transitions develop is not known in spite of their importance for research and applications. Here we unveil for the first time the MIT in Cr-doped V_2O_3 with submicron lateral resolution: with decreasing temperature, microscopic domains become metallic and coexist with an insulating background. This explains why the associated PM phase is actually a poor metal. The phase separation can be associated with a thermodynamic instability near the transition. This instability is reduced by pressure, that promotes a genuine Mott transition to an eventually homogeneous metallic state.

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