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Electrical measurements at the metal-insulator phase boundary in VO_2 nanobeams[1] DAVID COBDEN, JIANG WEI, ZENGHUI WANG, WEI CHEN, University of Washington — We study the electrical properties of vanadium dioxide nanobeams undergoing the metal-insulator transition (MIT), which occurs at a temperature of 67°C at ambient pressure. The nature of the MIT in bulk VO_2, although known to involve electron-electron correlations, has remained elusive since its discovery fifty years ago. In nanobeams clamped at both ends there is a coexistence regime which allows electrical measurements along the phase boundary. Remarkably, the resistivity of the insulating phase turns out to be constant along the phase boundary implying that the transition is driven by electron density, consistent with a Mott-type mechanism. The measurements show that the resistance of a domain wall is negligible, and the resistance of a nanowire gives a direct measure of the length of insulating phase present in the wire, allowing one to study the motion of the domain wall electrically with high precision.

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