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On the metal-insulator-transition in vanadium dioxide AZITA JOVAINI, SHIGEJI FUJITA, University at Buffalo, SALVADOR GODOY, UNAM, AKIRA SUZUKI, Tokyo University of Science — Vanadium dioxide (VO_2) undergoes a metal-insulator transition (MIT) at 340 K with the structural change from tetragonal to monoclinic crystal. The conductivity σ drops at MIT by four orders of magnitude. The low temperature monoclinic phase is known to have a lower ground-state energy. The existence of the k-vector $\mathbf{k}$ is prerequisite for the conduction since the $\mathbf{k}$ appears in the semiclassical equation of motion for the conduction electron (wave packet). The tetragonal $(VO_2)_3$ unit is periodic along the crystal's x-, y-, and z-axes, and hence there is a three-dimensional k-vector. There is a one-dimensional $\mathbf{k}$ for a monoclinic crystal. We believe this difference in the dimensionality of the k-vector is the cause of the conductivity drop.

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