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Electrical-transport properties of individual single-crystalline IrO_2 nanorods Y. H. LIN, Institute of Physics, National Chiao Tung University, Taiwan, T. C. LEE, Y. C. SUN, W. B. JIAN, Department of Electrophysics, National Chiao Tung University, Taiwan, H. M. CHANG, Y. S. HUANG, Department of Electronic Engineering, National Taiwan University of Science and Technology, Taiwan, J. J. LIN, Institute of Physics and Department of Electrophysics, National Chiao Tung University, Taiwan — We have studied the electrical-transport properties of individual single-crystalline IrO_2 nanorods (NRs) prepared by MOCVD. With the help of e-beam lithography, individual NRs are contacted by Cr/Au submicron electrodes from above. Utilizing different probe configurations, not only the intrinsic properties of the NRs but also the temperature dependence of the contact resistance, $R_{\rm contact}$, has been determined down to liquid-helium temperatures. Our measured resistivity behavior of the NRs is in close agreement with the current theoretical understanding of this material. On the other hand, we found that the temperature behavior of the $R_{\rm contact}$ obeys the law $\log R_{\rm contact} \propto T^{-1/2}$ over a wide temperature range from 100 K down to liquid-helium temperatures. This later conduction process is ascribed to the hopping of electrons through nanoscale metal granules accidentally formed at the contact region during the thermal evaporation of the submicron electrodes.

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