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Electrical-transport studies of individual RuO_2 nanowires and their nanowire contacts Y.H. LIN, Institute of Physics, National Chiao Tung University, Taiwan, K.J. LIN, F.R. CHEN, J.J. KAI, Department of Engineering and System Science, National Tsing Hua University, Taiwan, J.J. LIN, Institute of Physics and Department of Electrophysics, National Chiao Tung University, Taiwan
— Single-crystalline RuO_2 nanowires (NWs) have been prepared by the thermal evaporation method. With the help of e-beam lithography, individual NWs were contacted by submicron electrodes from above. By employing 4- and 2-probe configurations, not only the intrinsic electrical resistivities of the NWs but also the electronic contact resistances, $R_c(T)$, have been determined. Our measured resistivity behavior of the NWs is found to agree well with the current understanding of this rutile material within the framework of the Boltzmann transport theory. On the other hand, we found that, for high-resistance contacts, R_c increases rapidly with decreasing temperature and finally saturates at liquid-helium temperatures. This behavior of R_c can be satisfactorily explained in terms of the "thermally fluctuation-induced tunneling" conduction through a microscopic junction incidentally formed at the interface between the electrode and the NW.

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