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The Magnetic and Transport Properties of MxMnO2.yH2O with the alpha-MnO2-type structure DER-CHUNG YAN, Institute of Physics, Academia Sinica, Nankang, Taipei, Taiwan., C. C. CHI, Department of Physics, National Tsing Hua University, Hsinchu 300, Taiwan., HSIAO-YUN LIN, HORNG-YI TANG, Department of Applied Chemistry, National Chi Nan University, Puli, Nantou 545,Taiwan., M. K. WU, Institute of Physics, Academia Sinica, Nankang, Taipei, Taiwan. — The α-MnO_2, also called Hollandite, is an interesting material because it has 0.46 nm pore in its crystal structure, forming a one-dimensional tunnel. A series of α-MnO_2 samples with different counter ions in the tunnel were synthesized. The magnetic properties show the superparamagnetic transition for all samples. The blocking temperature depends on the ionic size of counter ions and grain size. The powdery sample with K^+ as main cations in the tunnel shows anomaly with an apparent upturn below the blocking temperature. In addition, the ZFC susceptibility is larger than the FC susceptibility. We explain the upturn by the suppressing of anisotropy at the bottleneck. The temperature dependence of resistivity of the K_xMnO_2 bulks with being sintered follows the general variable range hopping formula. The magnetoresistivity of the bulk sintered at 250 $^\circ$C is consistent with the prediction of three-dimensional variable range hopping with Coulomb gap. On the other hand, for the bulk sintered at 350 $^\circ$C, the exponent in the general variable range hopping formula is nearly independent of magnetic fields up to 7 Tesla.

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