COMMENTS ON THE MOTT-HUBBARD TRANSITION

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ABSTRACT

Comparison of the phase diagrams for the $RMnO_3$ and $RNiO_3$ families (R = rare-earth) show the influence of a strong intraatomic Hund exchange on the MnO_3 array, which approaches the Mott-Hubbard transition from the localized-electron side in $LaMnO_3$, and of the stronger O-2p component in the e_g orbitals of the NiO_3 array, which passes through the Mott-Hubbard transition between $SmNiO_3$ and $LaNiO_3$. The first-order character of the Mott-Hubbard transition at lower temperatures is demonstrated for mixed-valent as well as single-valent systems, for metal-metal as well as metal-oxygen-metal interactions. Comparisons of the transport properties of Fe_3O_4 above the Verwey transition with those of $La_{1-x}Sr_xCuO_4$, of the$RMnO_3$ family above the orbital-ordering temperature, and of the $RNiO_3$ family above the insulator-metal transition show that at higher temperatures the mobility of the charge carriers makes a smooth transition from polaronic to vibronic to itinerant behavior with increasing bandwidth.