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Photoemission spectroscopy of Mn-site doped charge-ordered system : $Nd_{0.5}A_{0.5}Mn_{1-y}Cr_yO_3$(A=Ca, Sr)

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Manganese perovskite oxides of $R_{1-x}A_xMnO_3$ (RAMO; R : rare earth, A : divalent alkaline earth metal) have been intensively investigated due to their colossal magneto-resistance (CMR) phenomena and the rich phase diagram of these materials, which includes such phenomena as the charge-ordering (CO) and the metal-insulator (MI) transitions. In particular, a few percent of impurity substitution (e.g., Cr) on Mn sites in $R_{0.5}A_{0.5}MnO_3$ drastically melts the CO and orbital ordered (CO-OO) state and makes the system ferromagnetic-metallic[1]. However, the melting mechanism and the nature of the metallic state are not well understood yet.

In order to understand the role of the electronic structure in the metal-insulator transition in impurity-doped $R_{0.5}A_{0.5}MnO_3$, we have performed resonant photoemission spectroscopy measurements for $Nd_{0.5}A_{0.5}Mn_{1-y}Cr_yO_3$ crystals by changing the divalent alkaline earth metals (A=Ca, Sr) and the impurity substitutes (y=0.07, 0.05). Resonant photoemission spectra have clearly revealed the Nd 4f, Mn 3d and Cr 3d contributions. High-resolution photoemission spectra near the Fermi level show differences in the electronic states due to a small deviation of impurity substitutes.

[참고문헌]

1. T. Kimura et al., Phys. Rev. Lett. 83, 3940 (1999).