Dopant-dependence on charge/orbital ordering in layered manganite $La_{0.5}Sr_{1.5}MnO_4$

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Manganites are intensively studied because of their unique features such as colossal magnetresistance effect and multiferroic behavior. When impurity ions are substituted for the manganese ions in the compound, a new local electronic state often emerges. In this study we have investigated the dopant effect on a typical charge/orbital ordered system, a layered manganite $La_{0.5}Sr_{1.5}MnO_4$, using resonant x-ray scattering (RXS) technique. The layered manganite $La_{0.5}Sr_{1.5}MnO_4$ shows charge/orbital ordering below 230 K. We have studied how the ordered states are changed by the 3% substitution of Cr, Fe and Ga ions for Mn ions. As a result, it is revealed that the charge/orbital ordered states are strongly suppressed by the substitution of impurity ions in all doped compounds, but the degrees of suppression of the ordering depend on dopant ions. We assume that the difference of the dopant effect between impurity ions is caused by the difference of the spin value.