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Lattice-form dependent charge- and orbital- ordered states in perovskite-related manganantes DAISUKE OKUYAMA, CMRG-RIKEN, YUSUKE TOKUNAGA, ERATO-JST, REIJI KUMAI, AIST, YASUJIRO TAGUCHI, CMRG-RIKEN, TAKA-HISA ARIMA, Tohoku Univ., YOSHINORI TOKURA, Univ. of Tokyo — Charge and orbital order in half-doped manganites has been extensively studied since the magnetic-field induced melting of charge and orbital order (CO-OO) results in colossal magnetoresistance phenomena. However, there remain two points to be clarified, concerning the CO-OO states. First issue is the degree of charge disproportionation (CD); Full CD between Mn^{3+} and Mn^{4+} ions has been widely believed while charge density wave ordering with less distinct CD has also been recently proposed. Another issue is the orbital shape (OS) at Mn^{3+} ion in the CO-OO phase. The reason why the OSs of (La,Ca)MnO_3 ($(3y^2\text{-}r^2)/(3x^2\text{-}r^2)$) and $(La,Sr)_2MnO_4$ ($(y^2\text{-}z^2)/(z^2\text{-}x^2)$) are different is not clarified. In our study, we tried to clarify the CDs and OSs in $(Eu,Ca)_2MnO_4$ and $(Pr,Sr,Ca)_3Mn_2O_7$ by means of x-ray crystal structural analyses and well established methods of bond valence sum and Kanamori diagram, and to compare with those of (Pr,Ca)MnO_3. We found that the CD of all the samples is much smaller than unity. In addition, the CDs and OSs are systematically dependent on the dimension of MnO_6 network. From simple consideration, we concluded that apical oxygens play an important role.

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