Charge distribution of Mn ion in artificial superlattices
\[ [(\text{LaMnO}_3)_m(\text{SrMnO}_3)_m]_n \]

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Introduction
Fabrication technology of the artificial superlattice structure composed of different compositions has been rapidly developed and opens a new field of materials physics. In the transition metal perovskite system, artificially controlled charge ordered states have been also built up by the film deposition technique.\(^1\) Moreover, it is indicated that the peculiar physical properties of the superlattice are realized by the interface state because the valence state of the transition metal near the interfaces cannot be simply controlled by the stacking pattern. Therefore, the determination of the spatial charge distribution of the transition metal site becomes important for the study of the superlattices. In this study, we focus on the superlattices of LaMnO\(_3\) and SrMnO\(_3\), \[ [(\text{LaMnO}_3)_m(\text{SrMnO}_3)_m]_n \],\(^2\) where the manganese valence is expected to be varied from 3+ to 4+ and the physical properties depend strongly on the periodicity \(m\).

To investigate the relation between the Mn valence state and the physical properties, we have tried to determine the charge distribution of the manganese ion using the anomalous x-ray scattering term of Mn near the K-edge.

Experiment
The high quality superlattices have been fabricated by a combinatorial pulsed laser deposition method.\(^3\)

Results
X-ray scattering experiments were carried out by a four-circle diffractometer at the beamline 1A. The incident x-ray energy is about 6.5keV of Mn K-edge.

References
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