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Structural changes related to dielectric anomalies in RFe_2O_4 (R=Lu and Y). Y. HORIBE, Dept. of Physics and Astronomy, Rutgers University, S. MORI, Y. MATSUO, S. SHINOHARA, Dept. of Physics, Osaka Prefecture University, N. IKEDA, Dept. of Physics, Okayama University, S-W. CHEONG, Dept. of Physics and Astronomy, Rutgers University — RFe_2O_4 (R=Lu and Y) have a characteristic rhombohedral structure ith the space group R-3m, in which the hexagonal double-layers of Fe-O ions are sandwiched by Lu-O layers. In addition, the average valence of Fe ions is $Fe^{2.5+}$, which implies that Fe^{2+} and Fe^{3+} ions occupy the equivalent site on the hexagonal layers with equal density. Recently, a regular arrangement of Fe^{2+} and Fe^{3+} in the hexagonal plane (charge ordering) is suggested on the basis of the anomalous dielectric behavior in YFe_2O_4. Thus, we investigated structural change due to the charge ordering in RFe_2O_4 (R=Lu and Y) mainly by transmission electron microscopy. We found characteristic superlattice reflections at (1/3 1/3 1/2)-type positions at room temperature in YFe_2O_4. It is suggested that the diffuse streaks are due to the charge ordering in the three-dimensional hexagonal plane. We examined structural change by obtaining the electron diffraction (ED) patterns in the warming process and found that successive structural phase transition takes place around 220K. It is considered that these transitions should be characterized as the change of the charge ordering pattern in the hexagonal plane and are strongly correlated to the anomalous dielectric properties found in YFe_2O_4.

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