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Charge disproportionation transition under external magnetic field in $La_{1/3}Sr_{2/3}FeO_{2.96}$

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The effects of magnetic field on the charge disproportionation (CD) transition for $La_{1/3}Sr_{2/3}FeO_{2.96}$ above its transition temperature are investigated using the external field Mössbauer spectroscopy. Without an external magnetic field, a completely paramagnetic singlet was obtained in the temperature range of the averaged valence state above the transition temperature, which was interpreted as coming from the average valence $Fe^{3.6+}$. Under the external magnetic field at 225 K, which is above the CD transition temperature, a doublet of considerable magnitude of splitting is superimposed to the central singlet. The origin of the doublet can be explained by a magnetic Zeeman interaction. However, it is found that there is still a considerable fraction of the Fe nuclei that does not experience the applied field. This is understood as an evidence of the fast electron transfer among Fe ions. The observed magnetic Zeeman splitting probably results from particular Fe ions in the neighbor of either an oxygen vacancy or a lattice imperfection such as the domain wall. [DOI: 10.1063/1.1855274]