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Photo-induced dynamics of charge ordering in $La_{1/3}Sr_{2/3}FeO_3$ probed by ultrafast hard x-ray diffraction[1] YI ZHU, Advanced Photon Source, Argonne National Lab, JASON HOFFMAN, CLARE ROWLAND, Center for Nanoscale Materials, Argonne National Laboratory, DONALD WALKO, JOHN FREELAND, PHILIP RYAN, Advanced Photon Source, Argonne National Lab, RICHARD SCHALLER, ANAND BHATTACHARYA, Center for Nanoscale Materials, Argonne National Laboratory, HAIDAN WEN, Advanced Photon Source, Argonne National Lab, ADVANCED PHOTON SOURCE, ARGONNE NATIONAL LAB TEAM, CENTER FOR NANOSCALE MATERIALS, ARGONNE NATIONAL LABORATORY TEAM — $La_{1/3}Sr_{2/3}FeO_3$ thin films exhibit strong charge ordering due to charge disproportionation of Fe^{3+}/Fe^{5+} ions along the [111] direction below $T_c \sim 200K$. In this study, a $La_{1/3}Sr_{2/3}FeO_3$ thin film was excited by ultrafast 355nm laser pulses, and the response of the charge ordering and the lattice was directly observed via ultrafast hard x-ray diffraction. We identified the threshold of the excitation laser fluence to melt the charge ordering diffraction peak. We also found charge ordering recovers in a few nanoseconds, faster than the lattice recovery. These findings indicate the non-thermal nature of the photo-induced dynamics of charge disordering in $La_{1/3}Sr_{2/3}FeO_3$.

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