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Time-resolved x-ray diffraction study of photoinduced strains in $h-LuFeO_3$ thin film[1] KISHAN SINHA, XUANYUAN JIANG, Department of Physics and Astronomy, University of Nebraska, Lincoln, Nebraska 68588, USA, XIAO WANG, Department of Physics, Bryn Mawr College, Bryn Mawr, Pennsylvania 19010, USA, ANTHONY DICHIARA, Advanced Photon Source, Argonne National Laboratory, Argonne, Illinois 60439, USA, XUEMEI CHENG, Department of Physics, Bryn Mawr College, Bryn Mawr, Pennsylvania 19010, USA, YUELIN LI, Advanced Photon Source, Argonne National Laboratory, Argonne, Illinois 60439, USA, XIAOSHAN XU, Department of Physics and Astronomy, Nebraska Center for Materials and Nanoscience, Univerity of Nebraska,Lincoln, Nebraska 68588, USA — We have studied the structural response of epitaxially stabilized h-LuFeO3 (0001) thin film to above-band-gap optical excitation (pump) using time-resolved x-ray diffraction (probe) at picosecond time scale. The shift in (004) Bragg peak induced by a 390 nm excitation (30 ps duration) has been studied as a function of pump fluence and pump-probe time delay. The out-of-plane photoinduced lattice strain ($\Delta c/c$) exhibits a non-linear relation with fluence. The relaxation time is on the order of 1 ns. These observations suggest a relaxation mechanism that may be mediated by combined effects of charge recombination and phonon relaxation.

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