Abstract Submitted
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Time-resolved hard X-ray nano-diffraction study on the long-lived strain in $BiFeO_3$ induced by optical transient grating[1] YI ZHU, Argonne National Lab, QINGTENG ZHANG, PICE CHEN, University of Wisconsin, Madison, CAROLINA ADAMO, Cornell University, ZHONGHOU CAI, DONALD WALKO, ERIC DUFRESNE, Argonne National Lab, DARRELL SCHLOM, Cornell University, PAUL EVANS, University of Wisconsin, Madison, HAIDAN WEN, Argonne National Lab, ARGONNE NATIONAL LAB TEAM, UNIVERSITY OF WISCONSIN, MADISON TEAM, CORNELL UNIVERSITY TEAM — Optical transient grating excitation was applied to induce spatially modulated strain in a $BiFeO_3$ thin film. The spatial profile and the dynamics of the photo-induced strain were measured by time-resolved hard X-ray nano-diffraction at beamline 7-ID of the Advanced Photon Source. By interfering two ultrafast laser beams at 400nm wavelength and $\sim$ 100fs pulse duration, an optical transient grating with $\sim$ 5micron period sinusoidal profile was created and used to excite the $BiFeO_3$ sample. By using the nano-focused ultrafast X-ray pulses, both the strain profile and the dynamics induced by the photo-generated carriers were mapped out. We found the out-of-plane strain profile remained sinusoidal while the strain amplitude modulation lasted tens of microseconds, indicating the non-thermal nature of this photo-induced strain in $BiFeO_3$.

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