Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Photonic modulations of strongly correlated phenomena in complex oxides YI-DE LIOU, National Cheng Kung University, WEN-YEN TZENG, National Chiao Tung University, HENG-JUI LIU, National Chung Hsing University, CHIH-WEI LUO, National Chiao Tung University, YI-CHUN CHEN, National Cheng Kung University, YING-HAO CHU, National Chiao Tung University, JAN-CHI YANG, National Cheng Kung University — The interplays of lattice, charge, orbital, and spin degrees of freedom in strongly correlated oxides result in a broad spectrum of intriguing functionalities. Researches have been enthusiastically devoted to the advanced modulation of these intriguing phenomena via external stimuli. In this work, a core novel material, strontium iridates (SrIrO3), which exhibits giant photostriction under light illumination is successfully developed. SrIrO3 thin film was deposited by pulsed laser deposition, by which a layer-by-layer growth mode can be well tuned. The atomic-flat surface and high quality epitaxy have been distinguished by AFM and HR-XRD. XAS has been used to characterize the valence state as well as the electronic structure of SrIrO3. Power-dependent Raman spectroscopy reveals that SrIrO3 shows a huge lattice change (˜1.5 %) under green laser illumination. We also studied ultrafast dynamics and photo-induced mechanical strain of SrIrO3 by dual-color transient reflectivity measurements. Through the fabrication of epitaxial heterostructures, we can elegantly transfer the photo-induced mechanical strain to the strongly correlated systems which grown on SrIrO3 layer, resulting in novel photonic modulations of correlated phenomena in complex oxides.

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Date submitted: 17 Jan 2017 Electronic form version 1.4