Contribution ID: **95** Type: **Poster**

Observation of Surface Scattered Wave Induced by fs-laser using Ultrafast Dark-Field X-ray Microscopy

DFXM (Dark-field X-ray Microscopy) has recently gained attention as a promising research method for clearly visualizing domains and defects within materials. The principle feature of DFXM is its ability to produce real-space images of domains selected by the orientation of the Bragg peak using an objective lens. Additionally, DFXM at XFEL facilities is notable for enabling time-resolved dynamics studies in conjunction with femtosecond laser pumping. One of these dynamics studies focuses on understanding the behavior of surface scattered waves and shock waves induced by lasers. This understanding is crucial not only for material applications but also for advancing the fundamental understanding of solid-state physics. In this presentation, I will discuss the behavior of scattered waves on the topological 2D material surface induced by fs-laser. The Bi2Se3 bulk crystal maintains strong crystallinity up to the surface, resulting in very clear DFXM results. Based on tests with approximately X-ray 1000 shots, we found that internal domains do not change in response to X-ray shots. However, a single laser shot generates transient surface scattered waves around 20 ps. As the laser fluence increases, the spacing of the ripple pattern decreases. We also observed that changes in the laser wavelength have little effect. These surface ripple patterns were found to form across domain boundaries on the surface. However, it was also observed that waves reflect at boundaries close to the surface. While surface scattered waves are considered to be caused by surface plasmon polaritons, other influences are also inferred to be present. This work was supported by the National Research Foundation of Korea grant NRF-2021R1A3B1077076

Please select the related topic from the list below

Instrumentation and methods

Primary authors: NAM, Daewoong (PAL-XFEL, Pohang, KOREA); KIM, Hyunjung (College of Nanoscience and Nanotechnolgy, Pusan National University, Pusan, KOREA); YONG, Isaac (Center for Ultrafast Phase Transformation, Department of Physics, Sogang University, Seoul, KOREA); OH, Jiseong (Center for Ultrafast Phase Transformation, Department of Physics, Sogang University, Seoul, KOREA); KIM, Sangsoo (PAL-XFEL, Pohang, KOREA); JEONG, Se-Young (College of Nanoscience and Nanotechnolgy, Pusan National University, Pusan, KOREA); LEE, Seungyun (Center for Ultrafast Phase Transformation, Department of Physics, Sogang University, Seoul, KOREA); HA, Sung Soo (Sogang university)

Presenter: HA, Sung Soo (Sogang university)

Session Classification: Poster session