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Surface and interface states of Bi_2Se_3 thin films investigated by second harmonic generation SUN YOUNG HAMH, SOON-HEE PARK, JONG SEOK LEE, Department of Physics and Photon Science, Gwangju Institute of Science and Technology, Gwangju 500-712, Korea, JEONG HEUM JEON, SE-JONG KHANG, Department of Physics, Korea University, Seoul 136-713, Korea, KWANG-NAM YU, ENJIP CHOI, Department of Physics, University of Seoul, Seoul 130-743 Korea, SEONGSHIK OH, Department of Physics and Astronomy, Rutgers, the State University of New Jersey, Piscataway, New Jersey 08854, USA, SUNG KIM, SUK-HO CHOI, Department of Applied Physics, College of Applied Science, Kyung Hee University, Yongin 446-701, Korea, JOONBUM PARK, JUN SUNG KIM, Department of Physics, Pohang University of Science and Technology, Pohang 790-784, Korea — Topological insulators (TIs) behave as a charge-gapped insulator in its interior, but hosting a spin-momentum-locked Dirac state at the surface. When the Fermi level crosses over conduction/valence band, undesirable bulk charge transport disturbs to exploit the surface nature, so that thin film TIs have been highlighted as a method to reduce bulk carrier effect due to large surface to volume ratio. In this presentation, we discuss surface and/or interface states for Bi_2Se_3 in form of film by exploiting second harmonic generation technique. Based on nonlinear susceptibility deduced from the model fitting, we investigate the details of band bending such as its direction and strength which were further addressed by examining terahertz field profile emitted from the sample. Finally, we discuss the evolution of these properties as a function of film thickness.

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