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Real time growth of bismuth teluride thin films investigated by LEEM HONGWEN LIU, WPI-AIMR, Tohoku University, N. FUKUI, L. ZHANG, Tohoku University, J.F. JIA, Tsinghua University, M.W. CHEN, Tohoku University, T. HASHIZUME, Tohoku University and Hitachi, Ltd. and Tokyo Institute of Technology, T. SAKURAI, Tohoku University, Q.-K. XUE, Tohoku University and Tsinghua University — Narrow gap semiconductors such as Bi_2Te_3 and Bi_2Se_3 have long been considered traditional thermoelectric materials. The very recent discovery of gapless metallic states at their surface characterizes them as a new class of quantum matter, the so-called topological insulators (TIs). To date, the TI materials have mainly been prepared in the form of crystals using melt-growth and suffer from unwanted bulk carriers or extrinsic dopants. In order to overcome this problem, efforts have been made to grow TI thin films. In this work, we use a low energy electron microscope (LEEM), which can reveal film growth processes in real time, to investigate the growth dynamics of Bi_2Te_3 films Combined with atomic force microscopy and Raman spectroscopy, we discuss the optimal conditions to obtain high quality Bi_2Te_3 films on several substrates.

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