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Impact of growth conditions on the MBE-grown topological insulator Bi_2Se_3 thin films[1] Y. LIU, Y.Y. LI, S. RAJPUT, M. WEINERT, L. LI, University of Wisconsin, Milwaukee — Recently, molecular beam epitaxy (MBE) has been successfully applied to prepare atomically flat topological insulator thin films that exhibit helical Dirac states. In this work, we systematically investigate the effects of substrate temperature and Bi/Se flux ratio on the morphology and properties of Bi_2Se_3 thin films grown on graphene/SiC(0001) by MBE. Under optimal growth conditions, *in situ* scanning tunneling microscopy indicates spiral growth [1], characterized by atomically smooth terraces 10 to 50 nm in width, separated by steps that are one quintuple-layer in height. *Ex situ* Raman spectroscopy reveals two characteristic peaks at 130 and 171 cm^{-1}, corresponding to the in-plane E_g^2 and out-of-plane A_{1g}^2 vibrational modes, respectively. The close resemblance of the positions and line shapes of both these peaks to those of bulk Bi_2Se_3 attest to the high quality of the film. These results and the impact of growth spirals on the properties of the topologically protected Dirac surface states of Bi_2Se_3 will be presented at the meeting.

[1] Y. Liu et al. PRL **108**, 115501 (2012).

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