

Abstract Submitted
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Characterization of high-quality Bi_2Se_3 films grown using a selenium cracker source¹ THERESA GINLEY, STEPHANIE LAW, University of Delaware — Topological insulators, including Bi_2Se_3 , are becoming increasingly prevalent in research due to their unique electronic properties these materials exhibit an insulating bulk but conducting surfaces with electron spin-momentum locking. Using Molecular Beam Epitaxy (MBE) it is possible to grow high-quality thin films of Bi_2Se_3 . Yet these films have not lived up to their potential, in part due to significant bulk conductivity arising from material defects like selenium vacancies. Current MBE growth methods for Bi_2Se_3 use standard selenium sources that evaporate large selenium molecules which must then be cracked into smaller molecules to be incorporated into the film. This process is inefficient and requires very high fluxes of selenium for good quality growths. However, using a selenium cracking source results in the evaporation of monomers and dimers, facilitating incorporation into the film. We will present electrical, structural, and optical measurements demonstrating that the use of a cracker source allows films to be grown using much lower selenium:bismuth flux ratios with good mobility and low carrier density.

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