Abstract Submitted
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Medium Energy Ion Scattering investigation of In diffusion in In_2Se_3/Bi_2Se_3 H.D. LEE, C. XU, S. SHUBEITA, M. BRAHLEK, N. KOIRALA, S. OH, T. GUSTAFSSON, Department of Physics and Astronomy, Rutgers University — In_2Se_3, a band insulator, and Bi_2Se_3, a three-dimensional topological insulator, have inherently good chemical and structural compatibility. This suggests possible promising applications of In_2Se_3/Bi_2Se_3 devices as tunnel barriers and gate dielectrics. Recently, it has been shown that the similar $(Bi_{1-x}In_x)_2Se_3$ thin system undergoes a transition from topological insulator to band insulator as a function of In concentration [1]. It is therefore important to understand the extent of In diffusion in In_2Se_3/Bi_2Se_3 and its consequences for the transport properties. We have grown In_2Se_3/Bi_2Se_3 thin films on sapphire by Molecular Beam Epitaxy at three different temperatures. Medium Energy Ion Scattering measurements of those films showed that the higher growth temperature resulted in more In diffusion while our transport measurements showed that the Bi_2Se_3 mobility increases as the growth temperature decreases. We found that the trend of the mobility change of In_2Se_3/Bi_2Se_3 depending on the diffusion of In is similar with the trend of the mobility of $(Bi_{1-x}In_x)_2Se_3$ as a function of In concentration [1].

[1] M. Brahlek, et al, Phys. Rev. Lett. 109, 186403 (2012)

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