

## An infra-red study of thin film $\text{Bi}_2\text{Se}_3$ electronic structure across multiple thicknesses

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The issue of self doping via selenium vacancies in the topological insulator (TI)  $\text{Bi}_2\text{Se}_3$  has hindered efforts to produce samples with surface dominated conductivity. In fact, previous transport measurements of  $\text{Bi}_2\text{Se}_3$  samples grown by molecular beam epitaxy (MBE) have demonstrated that the charge carrier density varies as a function of the thickness. To explore this issue in  $\text{Bi}_2\text{Se}_3$  we have used various methods of infrared spectroscopy, including transmission and ellipsometry, to probe the electronic structure of  $\text{Bi}_2\text{Se}_3$  thin films grown using MBE. From these measurements, we have developed an enhanced understanding of how the sample thickness affects the material properties.

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