

Abstract Submitted
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What Limits Mobility and Carrier Concentration in Epitaxial Topological Insulator Films? FERHAT KATMIS, VALLA FATEMI, HADAR STEINBERG, PENG WEI, PABLO JARILLO-HERRERO, JAGADEESH MOODERA, MIT — In order to investigate the predicted exotic behavior of topological insulators (TIs) epitaxial films with near ideal electronic properties are essential. Obtaining high quality TI films requires careful control of not only growth parameters but also a good understanding of the dynamics of film formation. We have developed methods to obtain consistently high mobility and low carrier density by carefully controlling the nucleation and growth process of Bi₂Se₃ epitaxial films. Such MBE grown epitaxial films have been well characterized by different diffraction based techniques and electrical transport to obtain a correlation between structural and electrical properties. This has allowed us to see their systematic dependence. For example, in thin films, carrier density in low $10^{12}/\text{cm}^2$ range with bulk mobilities higher than $3000 \text{ cm}^2/\text{V-s}$ are routinely seen which nicely compares very well with structural data. Acknowledgements: NSF grant DMR 1207469 and NSF DMR 08-19762 (CMSE – Initiative 2).

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