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Effect of Dielectric Materials on the Topological Insulator Bi_2Se_3 Surface States JIWON CHANG, LEONARD REGISTER, SANJAY BANERJEE, BHAGAWAN SAHU, Microelectronics Research Center, The University of Texas at Austin — We study the effects of crystalline dielectric materials on the electronic surface states of a strong topological band insulator (TI) Bi_2Se_3 using a density functional based electronic structure method [1]. We will discuss the sensitivity of Dirac point degeneracy and linear band dispersion of the TI with respect to different dielectric surface terminations as well as different relative atom positions of the dielectric and the TI. Both passivated and non-passivated substrate surfaces will be considered. Two representative dielectrics SiO_2 and boron nitride will be chosen to understand the physics of interplay of interface potential, linear band dispersion and the chemical environments of the TI surface states. Our findings have implications in interpreting experiments and designing novel nanoelectronics device concepts based on TIs.

[1] “Intrinsic and extrinsic perturbations on the surface states of topological insulator Bi_2Se_3 ,” J. Chang, P. Jadaun, L. F. Register, S. K. Banerjee and B. Sahu (In preparation)

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