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**Controlling topological insulating phases by tuning the coupling strength of Dirac fermions in chalcogenide ternary compounds** JEONG-WOO KIM, JINWOONG KIM, SEUNG-HOON JHI, Pohang University of Science and Technology — Chalcogenide ternary compounds such as $Ge_2Sb_2Te_5$ are considered as superlattice of topological insulating layers and band insulating layers. Using first-principles methods and a model Hamiltonian, we study the topological phases of the chalcogen compounds arising from the interactions of Dirac fermionic states existing at the interfaces between the topological insulating and band insulating layers. We particularly investigate the interactions of Dirac fermions upon varying the thickness of band insulating layers or upon introducing magnetic impurities in the layers. We observe a jump of Dirac cones from one time-reversal invariant momentum to another when the thickness is changed. We also discuss the degree of freedom in the spin helicity of the Dirac fermions and how it limits the topological phases.

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