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Enhanced surface state of topological insulators by optimal magnetic doping YAN NI, NICHOLAS MEYER, XIAOYU CHE, ZHEN ZHANG, CAJETAN NLEBEDIM, RAVI HADIMANI, DAVID JILES, Iowa State Univ — Topological insulators (TIs) attract attentions both for fundamental science and potential applications because of their bulk band inversion arising from the strong spin orbital coupling. In addition, magnetic impurities doped into TIs can lead to opening of energy gap and induce some interesting fundamental physical phenomena such as the quantum anomalous Hall effect and magnetoelectric effect. In this work, we investigate the manipulation of the Fermi level, the band structure, and related surface states of $(Sb_xBi_{1-x})_2Te_3$ by Cr doping. We will show the magnetic dopants in the TI films are necessary to sustain an insulating bulk while simultaneously keeping the Dirac point of the surface in the bulk gap of $(Sb_xBi_{1-x})_2Te_3$ thin film. It will be also shown that Cr doping in the films will both increase the magnetic response of the TI films by increasing the permeability and result in the opening a surface band gap. As a result, the materials can be made more suitable for spintronics and electronic devices such as magnetic sensors.

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