

Abstract Submitted
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Distinct Effect of Cr Bulk and Surface Doping on the Local Environment and Electronic Structure of Bi₂Se₃¹ TURGUT YILMAZ, Univ of Connecticut - Storrs, IVO PLETIKOSIC, Princeton University, TONICA VALLA, Brookhaven National Laboratory, BORIS SINKOVIC, Univ of Connecticut - Storrs — We report on studies of Cr doping of Bi₂Se₃ by comparing surface doped with bulk doped Bi₂Se₃ films and their electronic and local structures studied by in-situ ARPES and core-level photoemission spectroscopies, respectively. In the case of surface doping we see the evidence for Cr substituting the Bi by observation of the extra feature in the Bi 5d photoemission spectra that increases with doping. On the other hand the Cr 3p spectra show two distinct chemical states indicating that there are two different Cr locations with different local electronic configuration. However, unlike theoretical expectations, the electronic structure measured at 15 K shows that surface states preserve gapless feature with well defined Dirac cone and presence of quantum well states, induced by doping. In contrast, the bulk Cr doped Bi₂Se₃ films show gapped surface states with gap energy as large as 100 meV even at room temperature, which is far above the reported ferromagnetic transition temperature.

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