

Abstract Submitted
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Scanning tunneling microscopy of defects and electronic fluctuations in Cu-doped Bi_2Se_3 CHRISTOPHER MANN, University of Texas at Austin, DAMIEN WEST, Rensselaer Polytechnic Institute, IRENEUSZ MIOTKOWSKI, YONG CHEN, Purdue University, SHENGBAI ZHANG, Rensselaer Polytechnic Institute, CHIH-KANG SHIH, University of Texas at Austin — We report scanning tunneling microscopy and spectroscopy studies of the topological insulator $\text{Cu}_x\text{Bi}_2\text{Se}_3$. We have identified five different atomic-resolution signatures of Cu dopant-related point defects and correlated several of them to density functional theory simulations of the defects. Most interestingly, by investigating the dI/dV images of the known Bi_{Se} antisite defects as a function of bias, we show that local electronic structure can vary substantially over a length scale of 30nm, with amplitudes as large as $\pm 50\text{meV}$. The strong fluctuations appear to be caused by a variety of defects and may have consequences for the topological surface state, as revealed by quasiparticle scattering studies. Correlation of quasiparticle scattering with the various defects indicates that the surface state is robust to backscattering, though detailed analysis shows that some defects are more effective in producing stationary scattering states than others.

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