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Scanning tunneling spectroscopy investigation of the topological phase transition in $(Bi_{1-x}In_x)_2Se_3$ DANIEL WALKUP, WENWEN ZHOU, ILIJA ZELJKOVIC, Boston College, YOSHINORI OKADA, Tohoku University, ZHENSONG REN, KANE SCIPIONI, Boston College, STEPHEN WILSON, Boston College and University of California Santa Barbara, VIDYA MADHAVAN, Boston College and University of Illinois Urbana-Champaign — The three-dimensional topological insulator $(Bi_{1-x}In_x)_2Se_3$ undergoes a phase transition to a trivial insulator as Bi atoms are replaced with In. This chemical substitution is expected to reduce the spin-orbit coupling, lift the bulk band inversion and thus destroy the Dirac surface states present in the end-member Bi_2Se_3. Although photoemission and transport measurements have provided evidence for this phase transition in thin films, the nature of the surface state transformation across the critical point remains unclear, especially near the transition point where the surface state penetration depth becomes comparable to film thicknesses. Here, we present scanning tunneling microscopy experiments on single crystals of $(Bi_{1-x}In_x)_2Se_3$ for x $\sim$ 0-10%. Using Landau Level spectroscopy, we map the surface state dispersion across the phase transition. Additionally, we use local density of states mapping to reveal the local influence of the In dopants near the critical point.

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