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Scanning Tunneling Microscopy and Spectroscopy of Topological Insulators SERGEI URAZH DIN, West Virginia University, STUART TESSMER, Michigan State University, THEODORA KYRATSI, MERCOURI KANATZIDIS, Northwestern University — We performed cryogenic scanning tunneling microscopy and spectroscopy measurements of the surface and defect states in topological insulators Bi₂Se₃ and Bi₂Te₃. Our measurements demonstrate gapless surface states in both materials. While Bi₂Te₃ is naturally p-doped, we observed both p- and n-doped regions on the cleaved surface. These observations can be correlated with local cleaving within quintuple layers seen from topography measurements, suggesting a new route for surface doping of topological insulators. We also describe unique clover-shaped defect states appearing inside the bulk valence band. Our band structure calculations show that these states originate from a combination of bonding anisotropy and surface band bending, resulting in formation of subsurface resonances.

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