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One-dimensional edge states in Bi(111) bilayer grown on Sb$_2$Te$_3$\textsuperscript{1}
YAOYI LI, SHIVANI RAJPUT, DUSHYANT TOMER, LIAN LI, Univ of Wisconsin, Milwaukee — Well-ordered Bi bilayer islands with zigzag edges are grown epitaxially on Sb$_2$Te$_3$(111) film by molecular beam epitaxy. Scanning tunneling microscopy imaging shows that the Bi film assumes the lattice of the Sb$_2$Te$_3$, thus is coherently strained. Tunneling spectroscopy further reveals robust edge states, confirming it as a two-dimensional topological insulator. This is consistent with first-principles calculations that indicate the preservation of the topological nature of the Bi bilayer and edge states with only an energy shift even in the presence of strong interaction between Bi and Sb$_2$Te$_3$. These findings suggest that the interface between 2D and 3D TIs can be a promising platform to synthesize new topological matter.

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