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Engineering the electronic properties of topological insulator heterostructures DEMET USANMAZ, PINKU NATH, JOSE J. PLATA, Department of Mechanical Engineering and Materials Science, Duke University, Durham, NC 27708, USA, MARCO FORNARI, Department of Physics, Central Michigan University, Mount Pleasant, MI 48858, USA, MARCO BUONGIORNO NARDELLI, Department of Physics and Department of Chemistry, University of North Texas, Denton TX, USA, STEFANO CURTAROLO, Materials Science, Electrical Engineering, Physics and Chemistry, Duke University, Durham NC, 27708, USA — Topological insulators (TIs) have been the subject of extensive research due to their exotic properties, such as behaving as an insulator in the bulk and having topologically protected metallic states at the boundaries. The emergence of metallic states relies on the spin-orbit induced band inversion in bulk materials and is protected by time-reversal symmetry or crystal symmetry. These characteristics of TIs make them potential candidates for various applications from spintronics to quantum computers. Here, we investigate TI heterostructures by varying the thickness of the layers to define the transition from 3D to 2D behavior. This approach gives a better insight into the topological interface states, which is essential for the design of new materials with tunable electronic properties.

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