

Abstract Submitted  
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**A top-down approach to prepare bismuth bi-layer terminated  $\text{Bi}_2\text{Se}_3(0001)$**  ROOZBEH SHOKRI, HOLGER. L. MEYERHEIM, SUMALAY ROY, KATAYOON MOHSENI, ARTHUR ERNST, Max-Planck-Institut für Mikrostrukturphysik, D-06120 Halle, Germany, MIKHAIL M. OTROKOV, EVGENII V. CHULKOV, Departamento de Física de Materiales UPV/EHU, Centro de Física de Materiales CFM - MPC and Centro Mixto CSIC-UPV/EHU, Spain, JÜRGEN KIRSCHNER, Max-Planck-Institut für Mikrostrukturphysik, D-06120 Halle, Germany — A bi-layer of bismuth (Bi) in the (111) plane possesses strong spin-orbit coupling and represents a prototype 2D topological insulator (TI). In this study, we propose a novel top-down approach to prepare Bi bi-layer on 3D TI  $\text{Bi}_2\text{Se}_3(0001)$ . Combining scanning tunneling microscopy, X-ray crystal truncation rod analysis and Auger electron spectroscopy we demonstrate that under controlled exposure of  $\text{Bi}_2\text{Se}_3$  to atomic hydrogen flux the selenium is removed from the topmost quintuple layer and a flat Bi bi-layer terminated  $\text{Bi}_2\text{Se}_3$ , with  $\text{Bi}_2\text{Se}_3$ -terrace-size lateral extension is achieved. Our results suggest new perspectives to manipulate the electronic properties of both Bi and  $\text{Bi}_2\text{Se}_3$  TIs.

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