Abstract Submitted
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Intrinsic conduction through topological surface states of insulating Bi_2Te_3 epitaxial thin films[1] KATHARINA HOEFER, CHRISTOPH BECKER, DIANA RATA, Max Planck Institute for Chemical Physics of Solids, Dresden, JESSE SWANSON[2], University of British Columbia, Vancouver, PETER THALMEIER, LIU HAO TJENG, Max Planck Institute for Chemical Physics of Solids, Dresden — Topological insulators represent a novel state of matter with surface charge carriers having a massless Dirac dispersion and locked helical spin polarization. Many exciting experiments have been proposed by theory, yet, their execution have been hampered by the extrinsic conductivity associated with the unavoidable presence of defects in Bi_2Te_3 and Bi_2Se_3 bulk single crystals as well as impurities on their surfaces. Here we present the preparation of Bi_2Te_3 thin films that are insulating in the bulk and the four-point probe measurement of the conductivity of the Dirac states on surfaces that are intrinsically clean. The total amount of charge carriers in the experiment is of order 10^{12} cm^{-2} only and mobilities up to 4,600 cm^2/Vs have been observed. These values are achieved by carrying out the preparation, structural characterization, angle-resolved and x-ray photoemission analysis, and the temperature dependent four-point probe conductivity measurement all *in-situ* under ultra-high-vacuum conditions. This experimental approach opens the way to prepare devices that can exploit the intrinsic topological properties of the Dirac surface states.

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Katharina Hoefer
Max Planck Institute for Chemical Physics of Solids, Dresden

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