Abstract Submitted
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A large-energy-gap oxide topological insulator based on the superconductor BaBiO3[1] BINGHAI YAN, MARTIN JANSEN, CLAUDIA FELSER, Max Planck Institute for Chemical Physics of Solids — Topological insulators are a new class of quantum materials that are characterized by robust topological surface states (TSSs) inside the bulk-insulating gap, which hold great po- tential for applications in quantum information and spintronics as well as thermoelectrics. One major obstacle is the relatively small size of the bulk bandgap, which is typically around 0.3eV for the known topological insulator materials. Here we demonstrate through ab initio calculations that a known superconductor BaBiO3 (BBO) with a Tc of nearly 30 K emerges as a topological insulator in the electron-doped region. BBO exhibits a large topological energy gap of 0.7 eV, inside which a Dirac type of TSSs exists. As the first oxide topological insulator, BBO is naturally sta- ble against surface oxidization and degradation, distinct from chalcogenide topological insulators. An extra advantage of BBO lies in its ability to serve as an interface between TSSs and superconductors to realize Majorana fermions for future applications in quantum computation. Reference: B. Yan, M. Jansen, C. Feler, Nature Physics (2013) doi:10.1038/nphys2762 (arXiv:1308.2303)

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