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High-Temperature Quantum Anomalous-Hall Effect in a n-p Codoped Topological Insulator SHIFEI QI, University of Science & Technology of China & Shanxi Normal University, ZHENHUA QIAO, University of Science & Technology of China, HUA CHEN, University of Texas at Austin, XIAOHONG XU, Shanxi Normal University, ZHENYU ZHANG, University of Science & Technology of China, and Harvard University — Quantized anomalous-Hall effect (QAHE) has been theoretically predicted for over twenty years. Recently, it has been experimentally observed in magnetic topological insulators (TI). However, the extremely small band gap severely limits its potential application in novel nanoelectronics. In the present work, we use density functional theory calculations to establish a new materials design approach, compensated $n - p$ codoping, to predict a long-range ferromagnetic and insulating topological insulator with a relatively larger intrinsic band gap. By analyzing the band gap evolution as a function of the sample thickness and further calculating the corresponding Berry curvature, we show that the surface of the n-p codoped topological insulator supports a quantum anomalous Hall state at much higher temperatures than previously observed or predicted systems.

Shifei Qi
University of Science & Technology of China Shanxi Normal University

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