**Quantum Anomalous Hall Effect with Higher Chern Numbers in Electron-Doped CrSiTe3: A First-Principles Prediction**

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The nontrivial topology of electronic band structure can give rise to many novel phenomena like the quantum spin Hall effect (QSHE) or the quantum anomalous Hall effect (QAHE). A Chern insulator is such a topological state of matter exhibiting a nonzero quantized Hall conductivity without an external magnetic field. There have been several experimental efforts to realize QAHE by doping magnetic impurities into topological-insulator thin films. Here we report that the Chern insulator can be realized in a single layer of electron-doped CrSiTe3. We have performed first-principles density-functional-theory calculations to find the minimum energy configuration for both atomic and magnetic structures and determined that the ground state of pristine CrSiTe3 is a ferromagnetic insulator. We use the Wannier function to calculate the Berry curvatures and prove the nontrivial Chern numbers for the conduction bands consisting of mostly Cr *e*g orbitals hybridized with neighboring Te *p* orbitals in the honeycomb-lattice network of CrTe6 octahedrons. Further, we demonstrate that the electron-doping can raise the Fermi level to the middle of the eg manifold, which opens up a band-gap of about 20 meV. Consequently, the electron-doped CrSiTe3 becomes a QAHE insulator with higher Chern numbers. The origin of higher Chern numbers is attributed to the presence of multiple Dirac cones in the *e*g-manifold band structures without spin-orbit coupling, together with the broken time-reversal symmetry of the ferromagnetic CrSiTe3. We confirm that the nontrivial topology of the electron-doped CrSiTe3 remains robust in its bulk structure by showing the chiral edge states by carrying out the edge state calculation. Our result suggests that there is a new family of Chern insulator materials in the form of MAX2- or MX3-type two-dimensional materials.

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