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Visualizing ferromagnetism in Fe-doped Bi_2Se_3 topological insulator individual nanowires WEI NIU, XUEFENG WANG, Nanjing Univ — Time-reversal symmetry is broken by magnetic doping into the topological insulators, and an energy gap is opened thus generating massive surface carriers. Magnetically-doped Bi_2Se_3 nanowires have been prepared by chemical vapor deposition technique with a high Curie temperature. The magnetic force microscope images still reveal the obvious ferromagnetic contrast signal of the Fe-doped Bi_2Se_3 nanowires even at 40 K, indicating the direct evidence of visulizing ferromagnetism in magnetically-doped topological insulator nanowires. Through systematic magnetoresistance measurements on undoped and Fe-doped Bi_2Se_3 nanowires, we observe the weak anti-localization effect in Bi_2Se_3 nanowires indicating a strong spin-orbital coupling effect. Furthermore, we also observed a transition from weak anti-localization to weak localization behavior when magnetically-doping into topological insulator nanowires. Our results pave a potential way for future novel magnetoelectronic device applications.

Minhao Zhang
Nanjing Univ

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