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Large bulk Rashba-type spin splitting in copper-doped noncentrosymmetric BiTeI[1] WEI-LI LEE, CHANG-RAN WANG, Institute of Physics, Academia Sinica, JEN-CHUAN TUNG, Graduate Institute of Applied Physics, National Chengchi University, Taipei, Taiwan, R. SANKAR, Center for Condensed Matter Sciences, National Taiwan University, Taipei, Taiwan, CHIA-TSO HSIEH, YUNG-YU CHIEN, Institute of Physics, Academia Sinica, GUANG-YU GUO, Department of Physics and Center for Theoretical Sciences, National Taiwan University, Taipei, Taiwan, F.C. CHOU, Center for Condensed Matter Sciences, National Taiwan University, Taipei, Taiwan — BiTeI exhibits large Rashba spin splitting due to its noncentrosymmetric crystal structure. The study of the chemical doping effect is important in order to either tune the Fermi level or refine the crystal quality. Here, we report the magnetotransport measurement in high quality BiTeI single crystals with different copper dopings. We found that a small amount of copper doping improves the crystal quality significantly, which is supported by the transport data showing higher Hall mobility and larger amplitude in Shubnikov-de Haas oscillation at low temperature. Two distinct frequencies in Shubnikov-de Haas oscillation were observed, giving extremal Fermi surface areas of $A_S = 9.1 \times 10^{12}$ cm^{-2} and $A_L = 3.47 \times 10^{14}$ cm^{-2} with corresponding cyclotron masses m_s^*= 0.0353 m_e and m_L^*= 0.178 m_e, respectively. Those results are further compared with relativistic band structure calculations using three reported Te and I positions. Our analysis infers the crucial role of Bi-Te bond length in the observed large bulk Rashba-type spin-splitting effect in BiTeI.

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