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Realization of insulating state and superconductivity in Rashba semiconductor BiTeCl JIANJUN YING, VIKTOR STRUZHUKIN, ALEXANDER GONCHAROV, HO-KWANG MAO, Carnegie Inst of Washington, FEI CHEN, XIAN-HUI CHEN, University of Science and Technology of China, ALEXANDER GAVRILIUK, Russian Academy of Sciences, XIAO-JIA CHEN, Center for High Pressure Science and Technology Advanced Research — Measurements of the resistivity, Hall coefficient, and Raman spectroscopy are performed on a Rashba semiconductor BiTeCl single crystal at high pressures up to 50 GPa. We find that applying pressure first induces the theoretically predicted insulating state followed by a superconducting phase with the insulating normal state. Upon heavy compression, another different superconducting phase is entered with the metallic normal state. The dome-like evolution of the superconducting transition temperature with pressure is obtained with the crossover from the electron to hole carriers across the boundary of the two superconducting phases. These findings imply the possible realization of topological state of the insulating and superconducting phases in this material.

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