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Hybrid Superconducting Junctions of Bi_2Se_3 Topological Insulator Nanoribbons YONG-JOO DOH, Korea University Sejong Campus, HYUNHO NOH, Korea Research Institute of Standards and Science, LEE-SEUL PARK, Sookmyung Women's University, EUN-KYOUNG JEON, Korea Research Institute of Chemical Technology, HONG-SEOK KIM, Korea University Sejong Campus, JEONG-O LEE, Korea Research Institute of Chemical Technology, JIN SEOK LEE, Sookmyung Women's University, JINHEE KIM, Korea Research Institute of Standards and Science — Topological insulators are exotic materials with bulk band gap and metallic edge states which are protected on their own boundary topologically. Here, we report on the fabrication and measurement results of the superconducting proximity junctions of topological insulator nanoribbons of Bi_2Se_3. Single-crystalline Bi_2Se_3 nanoribbons are synthesized using the vapor-liquid-solid method, while the superconducting Al electrodes are formed on top of the nanowire. When a magnetic field (H) is applied along the axial direction, the magneto-resistance data exhibit quasi-periodic oscillations with an average periodicity of $H^* \sim 0.4$ T, which is consistent with the Aharonov-Bohm oscillations. In the superconducting state, the supercurrent branch with a critical current of $I_c \sim 90$ nA is clearly observed in the current-voltage curve as a result of the superconducting proximity effect in Bi_2Se_3 nanoribbon. Quantized voltage steps of the Bi_2Se_3 nanoribbon Josephson junction under the microwave irradiation satisfy the ac Josephson relation.

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