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Odd-parity magnetoresistance in pyrochlore iridate thin films with broken time-reversal symmetry TAKAHIRO FUJITA, YUSUKE KOZUKA, MASAKI UCHIDA, Univ of Tokyo, ATSUSHI TSUKAZAKI, Tohoku University, TAKA-HISA ARIMA, MASASHI KAWASAKI, Univ of Tokyo, DEPARTMENT OF APPLIED PHYSICS AND QUANTUM-PHASE ELECTRONICS CENTER TEAM, INSTITUTE FOR MATERIALS RESEARCH TEAM, PRESTO, JAPAN SCIENCE AND TECHNOLOGY AGENCY (JST) TEAM, DEPARTMENT OF ADVANCED MATERIALS SCIENCE TEAM, RIKEN CENTER FOR EMERGENT MATTER SCIENCE TEAM — Weyl Semimetal phase has a three dimensional Dirac-like band structure, which has been recently predicted to be materialized in lanthanides iridate pyrochlore ($Ln_2Ir_2O_7$), accompanied with all-in-all-out spin ordering. Nevertheless, obtaining high quality $Ln_2Ir_2O_7$ single crystal has been extremely challenging even in bulk. Here, we report on fabrication and magnetotransport property of $Eu_2Ir_2O_7$ single crystalline thin films. Our films show clear metal insulator transition at around 100 K. We reveal that one of the two degenerate all-in-all-out domain structures, which are interchangeable with time-reversal operation, can be selectively formed by the polarity of the cooling magnetic field. This domain is robustly sustained against sweep magnetic field of 9 T at 2 K, as evidenced by an unusual odd field dependent term in the magnetoresistance and an anomalous term in the Hall resistance. Our findings pave the way for exploring novel quantum transport predicted at their surfaces/interfaces or magnetic domain walls of the pyrochlore iridates.

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