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Anomalous domain-wall conductance in pyrochlore-type $Nd_2Ir_2O_7$ on the verge of metal-insulator transition KENTARO UEDA, JUN FUJIOKA, YOUTAROU TAKAHASHI, Univ of Tokyo, TAKEHITO SUZUKI, RIKEN CEMS, SHINTARO ISHIWATA, Univ of Tokyo, YASUJIRO TAGUCHI, RIKEN CEMS, MASASHI KAWASAKI, YOSHINORI TOKURA, Univ of Tokyo, RIKEN CEMS — Pyrochlore iridates have attracted much attention since the interplay between electron correlation and strong spin-orbit coupling can lead to various topologically-nontrivial phases such as Weyl semimetal. The Weyl semimetal phase shows k-linear dispersing excitations as described by the Weyl equation in the three-dimensional bulk and remarkable edge states (Fermi arcs) at the surface or domain boundary. Recent theoretical studies have shown that such metallic edge modes can survive at the magnetic domain wall even in the fully-gapped bulk state subsequent to the pair-annihilation of Weyl fermions. In this study, we have investigated the charge transport and the low-energy charge dynamics originating from the magnetic domain walls in pyrochlore-type $Nd_2Ir_2O_7$, whose bulk is a fully-gapped antiferromangnetic insulator in vicinity to Weyl semimetal. We observed that the antiferromagnetic domain wall is metallic, despite the fully-gapped insulating state in the bulk by means of charge transport and optical measurements. We discuss the origin of such highly conductive magnetic domain wall in terms of edge states inherent to the Weyl semimetal.

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