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Topologically protected chiral edge state realized on molecular graphene WONHEE KO, WARREN MAR, KENJIRO K. GOMES, DOMINIK K. RASTAWICKI, CHARLIE D. CAMP, HARI C. MANOHARAN, Stanford University — Graphene has many interesting topological properties arising from the hexagonal lattice shape and sublattice symmetry. Although its edge state is known to be extremely sensitive to the shape of the edge, and is non-topological, it has been shown that graphene with an energy gap produced by broken sublattice symmetry can possess different topologies due to different sign of the carrier mass. By making a junction of two gapped graphene regions with opposite mass, we can realize a topologically protected edge state at the mass domain wall junction, with chirality emerging from the valley degeneracy. Molecular graphene is an artificial honeycomb lattice built by atom manipulation, and due to its extreme tunability, we have realized a topological edge state between gapped molecular graphene regions with opposite signs of Dirac fermion mass. Enhanced density of states restricted only to the junction clearly shows the existence of the edge state. Also, its robustness to the geometrical detail is observed from its persistence over various edge structures, and chirality is revealed by selective scattering at the intersection of edges.

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