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**Effects of edge-potential on armchair graphene open boundary and nanoribbon** CHI-HSUAN CHIU, CHON-SAAR CHU, ElectroPhysice department, National Chiao Tung University, Taiwan — The physics for the edge state formation and gap opening at an armchair graphene open boundary and nanoribbon due to an edge potential are investigated. At an open boundary, the edge-potential $U_0$ is shown to turn on pseudospin-fipped (intravalley) scattering even though $U_0$ does not post an apparent breaking of the AB site (basis atoms) symmetry. The interference between the pseudospin conserving (intervalley) and nonconserving (intravalley) processes in the scattering state leads to a finite out-of-plane pseudospin density. Similar two-waves feature in the evanescent regime leads to the formation of the edge state. This physical origin of the edge state is different from that for the Tamm states in semiconductors. For an armchair graphene nanoribbon with gapless energy spectrum, applying $U_0$ to both edges opens up an energy gap. In addition, dispersive edge state can be found inside the energy gap for the bulk-like states. The$U_0$-induced out-of-plane pseudospin density vanishes for the armchair graphene nanoribbon, but we expect it to be finite, for more general cases, at an armchair graphene open boundary.

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