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One-dimensional extended defects in epitaxial graphene with metallic properties JAYEETA LAHIRI, YOU LIN, PINAR BOZKURT, IVAN OLEYNIK, MATTHIAS BATZILL, Department of Physics, University of South Florida, Tampa, FL 33620 — Extended one dimensional line defects with metallic electronic properties are described. These defects have been formed in epitaxial graphene on Ni(111) surfaces and are the consequence of domain boundaries between graphene-sheets occupying different registry relative to the nickel substrate. The domain boundary forms a reconstructed line defect with a repeat unit of one octagon and a pair of pentagons. All the atoms in the defect are sp^2 hybridized three-fold coordinated carbon and thus do not exhibit any dangling bonds. DFT calculations indicate that these defect lines exhibit similar flat band states at the Fermi-level as zigzag-edge states in nanoribbons. STM-imaging indicates a bright contrast surrounding these defects, which we attribute to the decaying wave function of the defect states and its associated self-doping effect in the surrounding graphene sheet. This makes this extended defect a metallic wire embedded in a perfect graphene lattice.

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