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Majorana zero modes through domain wall wires in inhomogeneous gated silicene XIAOTING ZHOU, Department of Physics, University of Texas at Austin, Austin, Texas 78712, USA, CHENG-YI HUANG, WEI-FENG TSAI, Department of Physics, National Sun Yat-sen University, Kaohsiung 80424, Taiwan — We report a new way to realize Majorana zero-modes in one-dimensional (1D) domain wall wires generated in inhomogeneous gated silicene sheet. By applying inhomogeneous perpendicular electric field to the gapped silicene sheet, 1D domain walls, which can host either propagating spinful fermions or spin-polarized fermions (in the presence of a Zeeman field), can be created at the desired positions with great flexibility. Since the appreciable spin-orbit couplings (SOC) due to the buckled structure of silicene are present, such domain wall propagating channels can be a good alternative of 1D semiconducting quantum wires with strong SOC, usually taken as an essential starting point to generate the end-point Majorana zero modes. By the proximity with a conventional s-wave superconductor and a modest magnetic field applied on the domain wall, our approach provides a clean way in sharp contrast to using the semiconducting wires, where the complexity of the subband issue could be significant, to realize the 1D Kitaev's chain with Majorana zero modes at the ends.

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