

Abstract Submitted
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Gated Silicene as a tunable source of nearly 100% spin-polarized electrons WEI-FENG TSAI, CHENG-YI HUANG, National Sun Yat-sen University, Taiwan, TAY-RONG CHANG, National Tsing Hua University, Taiwan, HSIN LIN, Northeastern University, HORNG-TAY JENG, National Tsing Hua University, Taiwan, ARUN BANSIL, Northeastern University — We demonstrate, via first-principles calculations, that gated silicene with a low-buckled honeycomb structure possesses two gapped Dirac cones with nearly full spin-polarization at the corners of the Brillouin zone. By using this key finding, we further propose a design of a silicene-based spin-filter to switch the output spin current simply by gating without the need to switch magnetic domains. Quantum transport calculations indicate that such designs will be highly efficient (nearly 100% spin-polarized) and robust against weak disorder and edge imperfections. We also propose a Y-shaped spin/valley separator that produces spin-polarized current at two output terminals with opposite spins.

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