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Electron Energy Loss Spectroscopy Studies of Silicene and Graphene OLEKSIY ROSLYAK, ANTONIOUS BALASSIS, Fordham University, NY, GODFREY GUMBS, Hunter College, CUNY, NY — Silicene is the silicon counterpart of graphene. However, the spin-orbit interaction in silicene opens up a substantial band gap. Consequently, there is an unambiguous low-frequency plasmon excitation originating from intra- and inter-band transitions. Both the plasmon intensity and lifetime depend on the width of the excitation gap separating electron-hole pairs, We present a formalism based on self-consistent field theory to investigates the rate of loss of energy of a beam of charged particles moving parallel and perpendicular to a silicene layer. The energy loss spectrum is presented as a function of the speed of the charged particles. We further study and compare the part of the energy absorbed by collective plasma excitation as well as by single particle excitations. We report clear spectral signatures of semi-metal to either band insulator or topological insulator. Plasmonic features of silicone flakes are also studied and compared to those of pristine graphene.

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