Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Nonlocal plasmon excitations for scaffolded structures of silicene, germanene and molybdenum disulfide GODFREY GUMBS, Hunter college, CUNY, ANDRII IUROV, Center for High Technology Materials, UNM, DANHONG HUANG, Air Force Research Laboratory, Kirtland Air Force Base — We apply our recently developed mean-field theory for a nonlocal plasmon dispersion for a 2D layer-conductor scaffold to buckled honeycomb lattices such as silicene and germanene, as well as group IV dichalcogenides. Numerical solutions for the plasmon branches and particle-hole modes have been obtained for a wide range of experimentally accessible frequencies and wavelengths, different spin-orbit and lattice asymmetry energy bandgaps, as well as various surface plasmon frequencies. Crucial differences are obtained for these plasmon modes in the buckled lattices, compared to that in graphene, were confirmed. We have also discuss the nonlocality of plasmons in molybdenum disulfide and observed several crucial closed-form analytical results within specified approximations. In all these novel two-dimensional lattices, the collective excitations exhibit unusual features which are expected to be of importance for the practical applications.

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Date submitted: 07 Feb 2017 Electronic form version 1.4