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Temperature-dependent collective effects for silicene and germanene GODFREY GUMBS, Hunter college, CUNY, ANDRII IUROV, Center for High Technology Materials, UNM, DANHONG HUANG, Air Force Research Laboratory, Kirtland Air Force Base — We calculated the exchange and correlation energies as well as the dynamical polarization functions for silicene, germanene and other buckled honeycomb lattices for a variety of temperatures. Comparison is made for the dependence of these energies on the chemical potential, field-induced band gap and the temperature from which we concluded that in many cases they behave qualitatively similarly. For example, increasing the doping or varying the temperature. In our calculations, we used the dynamical polarizability to investigate the "split" plasmon branches in buckled lattices and predict unique splitting, which is different from that in gapped graphene, for various energy gaps. Our results are crucial for stimulating electronic, transport and collective particle studies of these materials, as well as for enhancing silicene-based fabrication and technologies for photovoltaics and transistor devices.

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