

Abstract Submitted
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New Phases of Germanene V. ONGUN OZCELIK, ENGIN DURGUN, SALIM CIRACI, Bilkent University — Germanene, a graphene-like single-layer structure of Ge, has been shown to be stable and recently grown on Pt and Au substrates. We show that a Ge adatom adsorbed on germanene pushes down the host Ge atom underneath and forms a dumbbell structure. This exothermic process occurs spontaneously. The attractive dumbbell-dumbbell interaction favors high coverage of dumbbells which contain crucial information about multilayer germanene and silicene. This Letter heralds stable new phases of germanene, which are constructed from periodically repeating coverage of dumbbell structures and display diversity of electronic and magnetic properties. Formation of multilayer silicene from the dumbbell units is also presented.

[1] V. O. Ozcelik, E. Durgun, and S. Ciraci, *J. Phys. Chem. Lett.* 5 (15), 2694-2699 (2014).

[2] S. Cahangirov, V. O. Ozcelik, A. Rubio, and S. Ciraci, *Phys. Rev. B* 90, 085426 (2014).

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