Two-dimensional (2D) materials are one of the attention centers of material science due to their fascinating physical properties and potential device application. Most of the efforts are applied towards materials with honeycomb lattice such as graphene, silicene, germanene and similar. This is because of interesting physics of Dirac fermions. It was shown, however, that Dirac-like electron dispersion is possible in non-honeycomb lattices [1, 2], however the studies of non-honeycomb lattice 2D materials are rather rare up to date. One of such possible atomic lattices is a triangular one. Triangular lattices of heavy group IV elements has been addressed previously in a context of Mott-insulator and topological-insulator state of sparse (√3x√3) adatom reconstruction on hexagonal surfaces of SiC(0001) [3] and Si(111) [4]. Dense (1x1)-type lattices, where metal atoms are directly interacting through in-plane bonding (Fig. 1a), are not reported.

Here we present our ab initio calculations and experimental results showing that such triangular atomic lattices of Ge, Sn and Pb could be stable on SiC(0001), and especially at graphene/SiC(0001) interface. Non-trivial bonding configuration in this 2D layers results in formation of perfect 2D metal. It also exhibits Dirac-cone-like electron dispersion features. Owing to large spin-orbit interaction (SOI), these layers show both Rashba- and non-Rashba-type of spin-polarization of electron bands at high symmetry points in the Brillouin zone simultaneously (Fig. 1b) which has not been observed before and represents an interesting case both for science and possible application in spintronic device application.

**References:**