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Spin structure of germanene quantum dot as a function of normal electric field APALKOV VADYM, VENKATA CHAGANTI, Georgia State University — Germanene quantum dot consisting of 13 germanium atoms is studied numerically within the nearest neighbor tight-binding model. Both the energy spectra and the spin structure of the corresponding Eigen-functions are obtained. Due to strong spin-orbit interaction in germanene the spin polarization of the germanene quantum dot strongly depends on the energy of the corresponding Eigen-state and on the external electric field, E_z. There are two states with energies close to zero, for which the direction of the spin is along z-axis, where z-axis is perpendicular of the quantum dot layer. For the higher energy levels the spin deviates from the z-axis with maximum angle θ_{max} =3.9^0 for the levels with energy 1128 meV (for electron channel) and -1128 meV (for hole channel) and zero electric field, E_z =0. The angle θ_{max} increases almost linearly with E_z and takes the value of 4.2^0 at E_z =100 meV/Å. The in-plane direction of spin is also sensitive to external electric field. With increasing electric field, the in-plane spin rotates in the anticlockwise and clockwise directions for the 1128 meV and -1128 meV levels, respectively. Due to such sensitivity of spin polarization to external electric field, applying a bias voltage can control the spin current through germanene quantum dot.

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