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Room temperature quantum spin Hall thin film for buckled honeycomb structures of silicon, germanium, and tin TAY-RONG CHANG, National Tsing Hua U., Hsinchu, Taiwan, HSIN LIN, Northeastern U., HORNG-TAY JENG, National Tsing Hua U., Hsinchu, Taiwan and Institute of Physics, Academia Sinica, Taipei, Taiwan, M.Z. HASAN, Princeton U., ARUN BANSIL, Northeastern U. — We have carried out first-principles calculations on buckled honeycomb structures of silicon, germanium and tin. When the spin-orbit coupling is included in the computations, these two dimensional (2D) systems are found to be in a quantum spin Hall phase with nontrivial topological invariant Z_2 =-1, and a band gap that increases with increasing atomic number. In particular, we predict that buckled honeycomb Sn thin film is a room temperature quantum spin Hall insulator with 0.25 eV band gap.



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