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Giant topological insulator gap and Rashba splitting in honeycomb Pb[1] HAIYAN HE, JUN HU, RUQIAN WU, Univ of California - Irvine, RUQIAN WU'S GROUP TEAM — It was predicted that graphene can be a topological insulator (TI) due to its special Dirac states and spin-orbit coupling (SOC). However, the SOC gap of pure graphene is too small for experimental observation. It was found that heavier group IV elements, such as Si and Ge, can also produce the TI state in the tow-dimensional honeycomb lattice, with their SOC gaps a few orders larger than that of graphene. In the present work, we find that the honeycomb Pb is also a TI, with a SOC gap as large as 250 meV. We demonstrate the feasibility of making a honeycomb Pb monolayer on the $Al_2O_3(0001)$ substrate. Moreover, $Pb/Al_2O_3(0001)$ has a giant Rashba splitting of 270 meV, useful for spintronics and topotronics applications.

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