Abstract Submitted
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The spin orbit coupling and magnetization in graphene\YIG and WTe2\graphene\YIG[1] MASATOSHI ONOUE, RUQIAN WU, Univ of California - Irvine, BOWEN YANG, JING SHI, Univ of California - Riverside — Quantum anomalous Hall effect (QAHE) may occur in graphene if there are both exchange field and Rashba spin-orbit coupling (SOC). Since pristine graphene is not magnetic and has extremely weak SOC, these two ingredients need to be induced externally through the proximity effect or electric field. Recently experiment found the anomalous Hall effect in graphene when it is supported on yttrium-iron-garnet (YIG), indicating the proximity-induced spin polarization in graphene. However QAHE has not been observed due to small Rashba SOC. In this work, we explore the means that may lead to strong enhancement of Rashba SOC, through first-principles calculations for graphene\YIG and WTe2\graphene\YIG. We find that the Rashba SOC strength is only 1.1 meV for graphene on YIG, whereas the exchange splitting is sizeable, 15 meV. The coverage of a WTe2 layer on graphene\YIG enhances the Rashba SOC but lowers the magnetization. The presence of electric field may offer a balance between these two quantities and the physical origins will be discussed.

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