

Abstract Submitted
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Gapped Dirac cone in silicene and germanene on $\text{Al}_2\text{O}_3(0001)$

MINGXING CHEN, MICHAEL WEINERT, Univ of Wisconsin, Milwaukee — Developing guidelines to find promising substrates that can stabilize the monolayer honeycomb structures of silicene and germanene while simultaneously preserving the Dirac-electron-driven properties is of practical importance for applications. From first-principles calculations, we find that silicene on Al-terminated $\text{Al}_2\text{O}_3(0001)$ retains the main structural profile of the ideal low-buckled silicene with a binding energy comparable to that of silicene on Ag(111). Unfolded k -projected bands reveal that a gapped Dirac cone is formed at the K point. The underlying mechanism is that the substrate has a large energy gap and the workfunctions are such that there is little direct bonding of between the silicene Dirac states and the substrate, which further guides us to find gapped Dirac states in germanene on $\text{Al}_2\text{O}_3(0001)$.

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