

Decoupling epitaxial graphene by Au intercalation

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A monolayer of graphene, where carbon atoms are sp^2 -bonded in a honeycomb lattice, constitutes an ideal two-dimensional crystal. Electrons in graphene behave like massless Dirac particles leading to an extremely high carrier mobility [1]. The only feasible route to exploit graphene's intriguing electronic properties suitable for large scale production is epitaxial growth on a substrate. The presence of the substrate will, however, always influence the electronic properties of the graphene layer. To preserve the promising electronic properties of graphene it is therefore desirable to decouple the graphene layer from the substrate after epitaxial growth.

We could show with angle-resolved photoemission spectroscopy (ARPES) and low energy electron diffraction (LEED) that graphene epitaxially grown on SiC can be successfully decoupled from the substrate by gold intercalation. Furthermore, the Au-intercalated graphene monolayer (ML) is of higher crystalline quality than the conventional ML grown on SiC: band structure measurements reveal a considerable decrease in line width after Au intercalation which we attribute to a reduced defect density. These findings are supported by scanning tunneling microscopy (STM) and Raman data.

References:

[1] A. K. Geim & K. S. Novoselov, Nature Mater. **6**, 183 (2007)

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