

Graphene beyond two dimension

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In this talk, I will present how to study graphene beyond two dimension. Higher dimensional graphene can be achieved in two different ways.

First, we demonstrate that 3D designed freestanding graphene architecture can be fabricated in a controlled manner, which can be expandable from the micro and nanometer scale. A 3D patterned SiC wafer was used to grow a 3D designed freestanding graphene architecture (**Fig. 1**). More interestingly, the 3D designed freestanding graphene architecture was very mechanically sustainable under elastic or plastic deformation, as confirmed by atomic force microscopy. This mechanical sustainability made electrical current through the 3D graphene architecture reversible under the deformation process, as observed by conducting AFM.

Second, I will present how to touch higher dimensional Dirac electrons using bilayer graphene with an incommensurate phase. We achieved the bilayer graphene with an incommensurate phase using epitaxial growth, where the epitaxial growth make it possible to control the rotational angle between the two graphene layers (**Fig. 2**).

Figures



Figure 1: Typical 3D structure of graphene

(Graphene in 3D space).

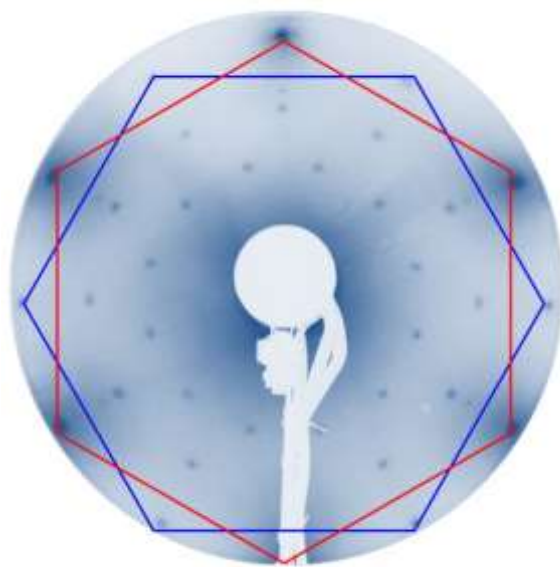


Figure 2: Bilayer graphene with incommensurate phase, where we can touch Dirac electrons in electrical higher dimension.