

The Design and Fabrication of Twisted Multilayer Graphene with Fine Tunable Rotated Angle

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Abstract: The property of few-layer graphene is determined by the rotation angles and interactions between layers. The theoretical calculation will guide the design and fabrication of the rotated graphene. It has been demonstrated that strong interlayer interactions will occur in the low rotation-angle regime. Strong Raman G band enhancement is observed at specific angle, which depend on the energy of the excitation laser. The rotated graphene used in experiments are commonly grown by the CVD method, and then the twisting angles are identified by TEM analysis. However, the control of the twisting angle could be hard to be achieved by this method. To find the sample whose rotation angle is closing to the designed angle, a great number of rotated graphene need to be prepared. In addition, only double-layer graphene with large scale can be prepared by this method. In order to achieve the designed rotation-angle and specific shaps, a new process based on the transfer of microcleaving graphene and femtosecond laser microfabrication is developed. The deviation of the rotation angle fabricated by this method is lower than 0.1°. This method based on microcleaving graphene could achieve the fabrication of the rotated graphene with more than two layers, which will great promote the study of the rotated graphene in theory and application.

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