

Elementary Studies of Twisted Bilayer Graphene

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In the nanotechnology field, some existing materials and applications are harmful to the environment, not efficient for certain tasks, or too expensive to be fully utilized. Graphene is a strong and cheap material that can be used to improve current nanotechnologies for more practical uses in society. Twisted bilayer graphene (TBG) is an orientation of graphene layers that exhibit different properties than regular bilayer graphene. It is made by placing a single layer of graphene on top of another at an angle with respect to the other lattice orientation. Understanding the characteristics of TBG is important to uncover more physics of graphene as well as interesting applications for TBG directly. By means of mechanical exfoliation with single layer graphene, we can isolate single layers of graphene. We used a transfer device that uses a vacuum chamber and heater to align the layers and create TBG with different twist angles. Raman Spectroscopy tests are done to find band energy peaks and document how those peaks change with respect to the twist angle. The process of transferring single layer graphene onto boron nitride substrates was initiated. Further work includes transferring a second layer on top of the substrate and running Raman tests to check its properties. Further research is needed to fully understand the characteristics of graphene, but understanding the energy properties of TBG will give valuable insight.