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Electronic Band Structure Modification upon Doping in Twisted Bilayer Graphene SHENGQIANG HUANG, MATTHEW YANKOWITZ, KANOKPORN CHATTRAKUN, ARVINDER SANDHU, BRIAN LEROY, Univ of Arizona — In twisted bilayer graphene, the electronic band structure and phonon dispersion depend on the rotation angle between the layers. From 9 to 15 degrees, the Raman G peak measured with a 532 nm laser is enhanced due to an increased density of states. The enhancement is a maximum at a critical angle of about 12 degrees where the laser energy matches the energy separation between the van Hove singularities in conduction and valance bands. We conduct a systematic study of the G peak enhancement upon doping up to charge densities of $2*10^{13}$ cm^{-2}. The G peak enhancement drops monotonously upon doping for angles smaller than the critical angle. In contrast, for angles larger than the critical angle, the G peak enhancement increases with doping at first before decreasing at higher doping levels. The charge density where the maximum enhancement occurs, scales with the rotation angle above the critical angle. This indicates that the band structure of twisted bilayer graphene is modified and the Fermi velocity is reduced upon doping.

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