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Twisted bilayer graphene plasmonic crystal

Twisted bilayer graphene (TBG) consists of two layers of graphene rotated relative to each other. At very small twist angle, the atomic lattices relax and form a periodic array of Bernal-stacked domains separated by solitons. The solitons host topologically protected states and have previously been shown to efficiently scatter propagating surface plasmon polaritons (SPPs) [1]. Therefore, an array of such solitons with a periodicity similar to the wavelength of SPPs should act as a photonic crystal for the SPPs. In this work, we use infrared nano-imaging to verify this proposition and demonstrate the interference of propagating SPPs in TBG. Furthermore, our calculations predict that a full plasmonic band gap is possible in this system.

References

[1] Jiang et al, Nano Lett, 17:7080 (2017)