Stark Tuning of Single Photon Emitters in Hexagonal Boron Nitride

Gichang Noh,[1] Daebok Choi,[1] Jin-Hun Kim,[2] Dong-Gil Im,[2]
Yoon-Ho Kim,[2] Hosung Seo,[1] Jieun Lee[1]

[1] Department of Physics and Department of Energy Systems Research, Ajou University, Suwon 16499, Korea

[2] Department of Physics, Pohang University of Science and Technology (POSTECH), Pohang 37673, Korea

Single photon emitters are fundamental resources of quantum optics and quantum information technologies. Recently, the emergence of single photon emission in atomic defects in hexagonal Boron Nitride (*h*-BN) at room temperature has evoked great interests in 2D-material-based single photon sources. For full exploitation of 2D single photon emitters for quantum technologies, however, the ability to control each atomic defect individually is critical. In this work, we show the electrical control of single photon emission in *h*-BN induced by an out-of-plane electric field [1]. This has been possible by fabricating a vertical heterostructure of *h*-BN containing atomic defects with graphene gates. A diverse spectral trail of Stark shifts is measured, providing information on defects' dipole transitions. The effect also persists at room temperature. We will also show possible ground states of defect structures that can induce the observed Stark shifts.

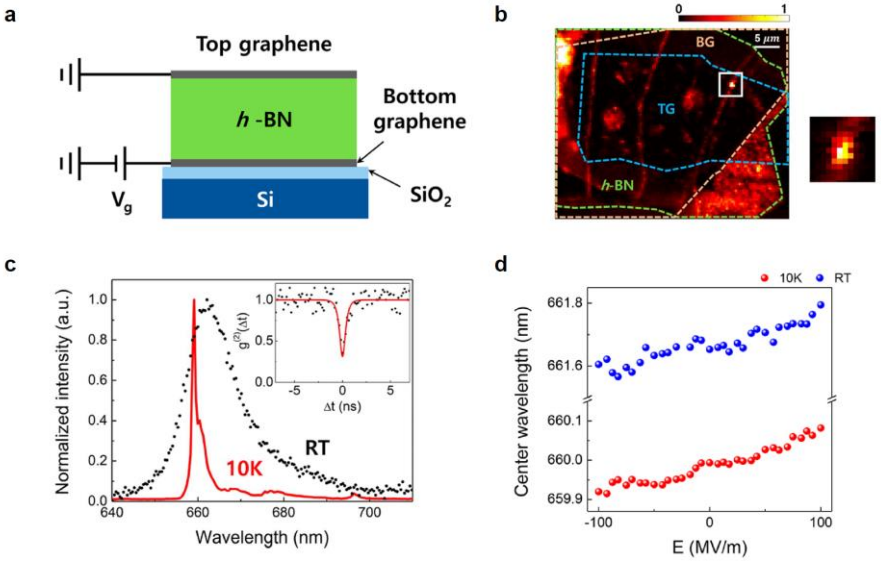

Figure 1. (a) Device schematics. (b) Photoluminescence (PL) mapping of a device. Inset shows the emission from a defect center. (c) PL spectrum and (d) Stark tuning of the emitter shown in (b) at 10 K and room temperature.

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+ Author for correspondence: jelee@ajou.ac.kr