

Large perpendicular field in bilayer TMD via hybrid molecular gating

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We consider structures in which bilayer TMDs are sandwiched between a layer of molecules and Si gate. We show that these structure allow increasing, by a factor of 2, maximum electric field achievable in this 2D material. This in turn, allows reaching electric field >0.2 V/nm. In MoS₂ this is sufficient to bring interlayer excitons IX into resonance with either A or B intralayer excitons. We study coupling between these excitons, and give an outlook on the new technique to achieve large perpendicular electric fields detectable in optical measurements.

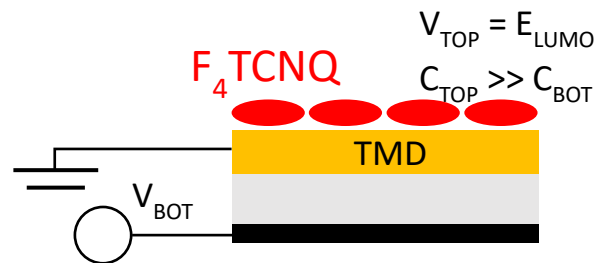


Figure 1: Schematic of a sample consisting of bilayer MoS₂ with electrostatic gate on one side, and molecules gate on the other, with potential defined by LUMO level of the molecule.

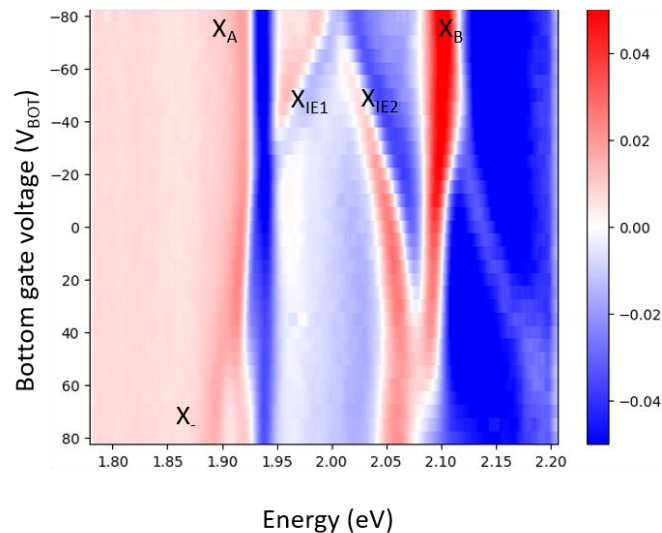


Figure 2: First derivative of reflectivity contrast, shows the highest optically detectable interlayer exciton Stark splitting in this material.