

Seminar of the Department. 26

Thin Layers and nanostructures

Fyzikální ústav AVČR, Cukrovarnická 10, Praha 6

Date : 06. 08. 2019 , Tuesday
Time : 10:00 am
Place : Library, Building A, 1st floor
Topic

Remote control of electronic correlation and excitonic effects in 2D materials

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2D materials with reduced dimensionality exhibit unprecedented tunability in both their electronic and optical properties due to the high susceptibility to the doping and the change of many-electron effects. Here we demonstrate a tunable quasiparticle band gap and excitonic effects in back-gated 2D material devices. Using low-temperature scanning tunnelling microscopy (LT-STM), we probed gate-tunable correlation and excitonic effects of recently-emerged 2D materials including few-layer black phosphorus (BP) and monolayer TMDs. The demonstration of field-tunable band gap and excitonic effects in 2D material devices paves the way to designing novel electro-optic modulators and photodetector devices. I will also discuss our recent STM and q-Plus AFM studies of atomic defects in 2D materials with an aim to correlate these defect physics to the device characteristics. Our findings may open up the new avenue for the investigation into charge transport through single defect and dopants in nanodevices.

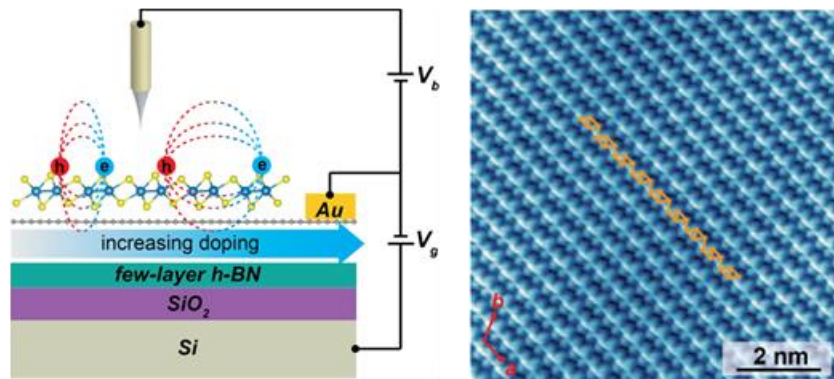


Figure STM study of back-gated 2D material devices

Reference

- (1) *Nano letters* 17 (11), 6935, 2017
- (2) *Nature nanotechnology* 13 (9), 828, 2018
- (3) *Nature Communications*, 10, 477, 2019
- (4) *Science Advances* 5 (7), eaaw2347, 2019

Professional guarantor: Ing. Pavel Jelínek, Ph.D.