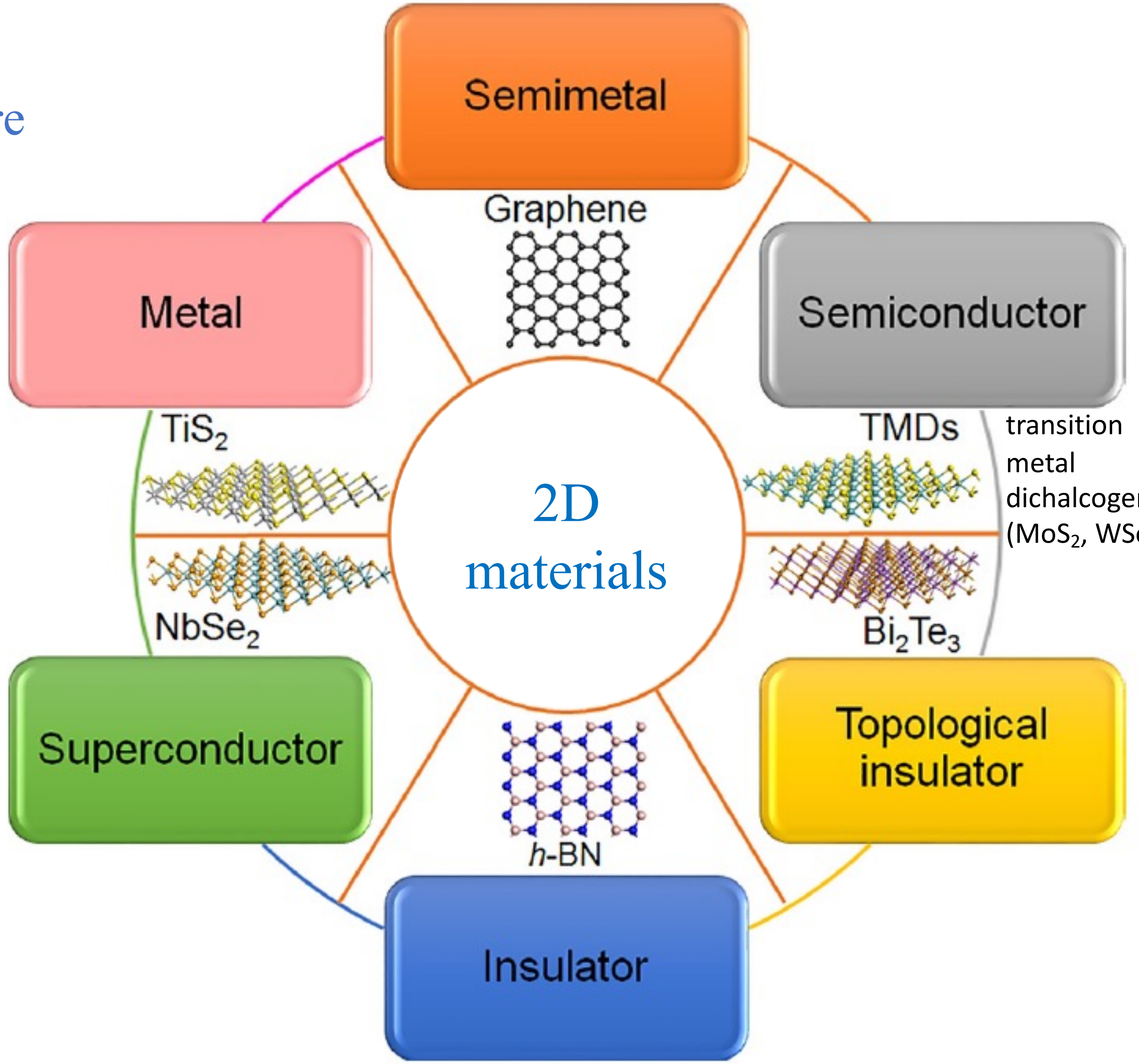
2D materials

Properties depend
on the band structure



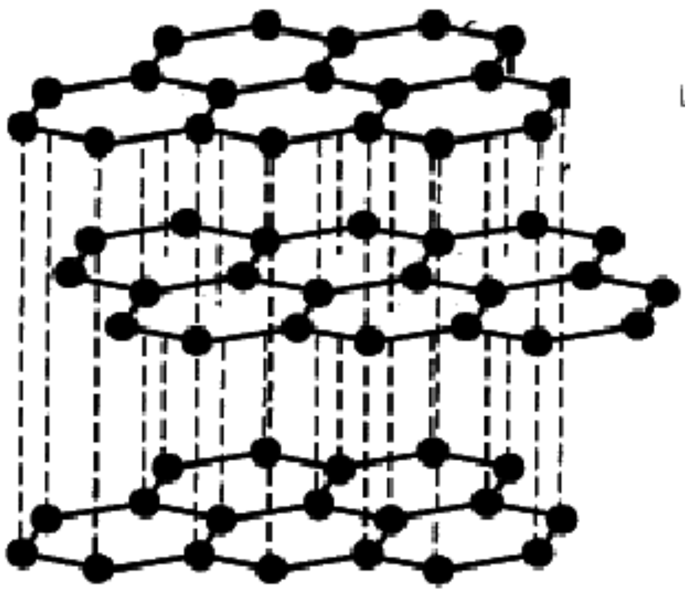
transition
metal
dichalcogenides
(MoS_2, WSe_2,...)

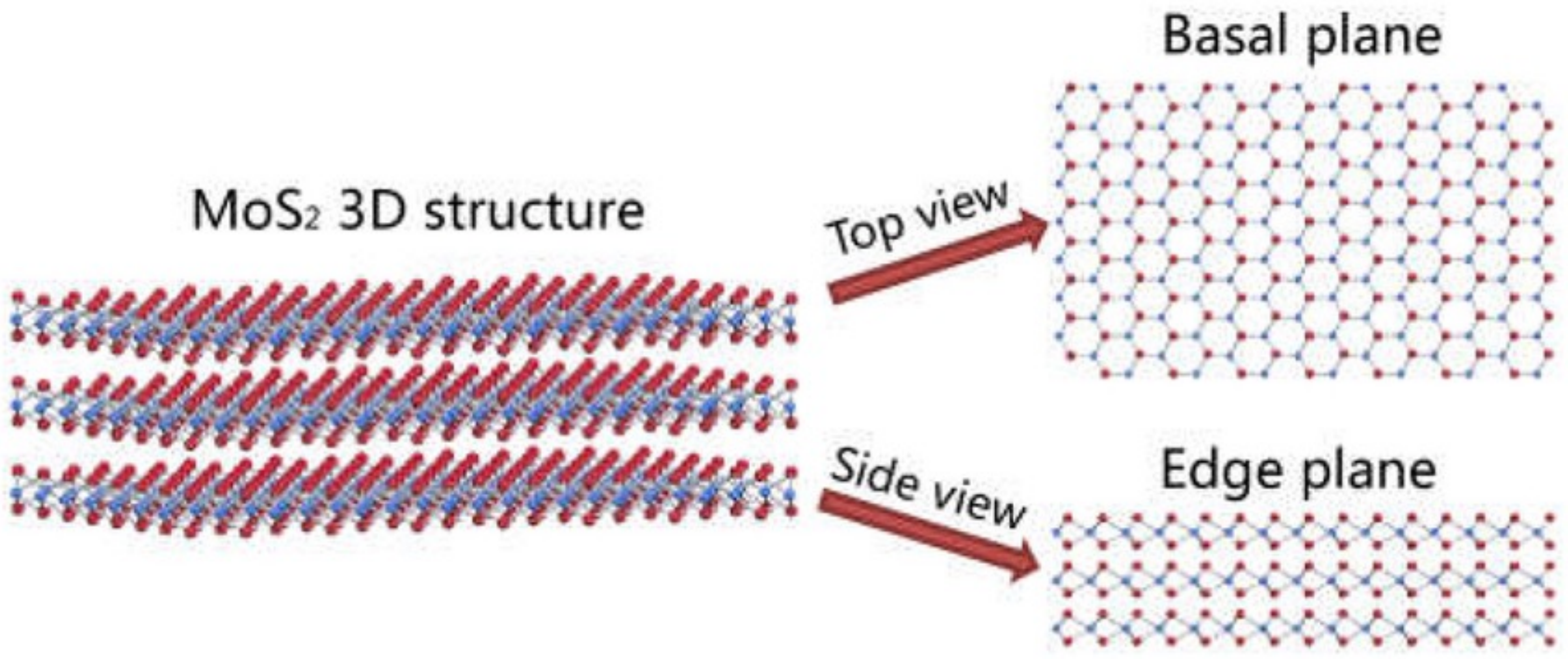
Applications depend
on the properties

https://doi.org/10.1063/1.4983646; DOI: 10.1007/978-3-319-91572-2_1

van der Waals layered materials

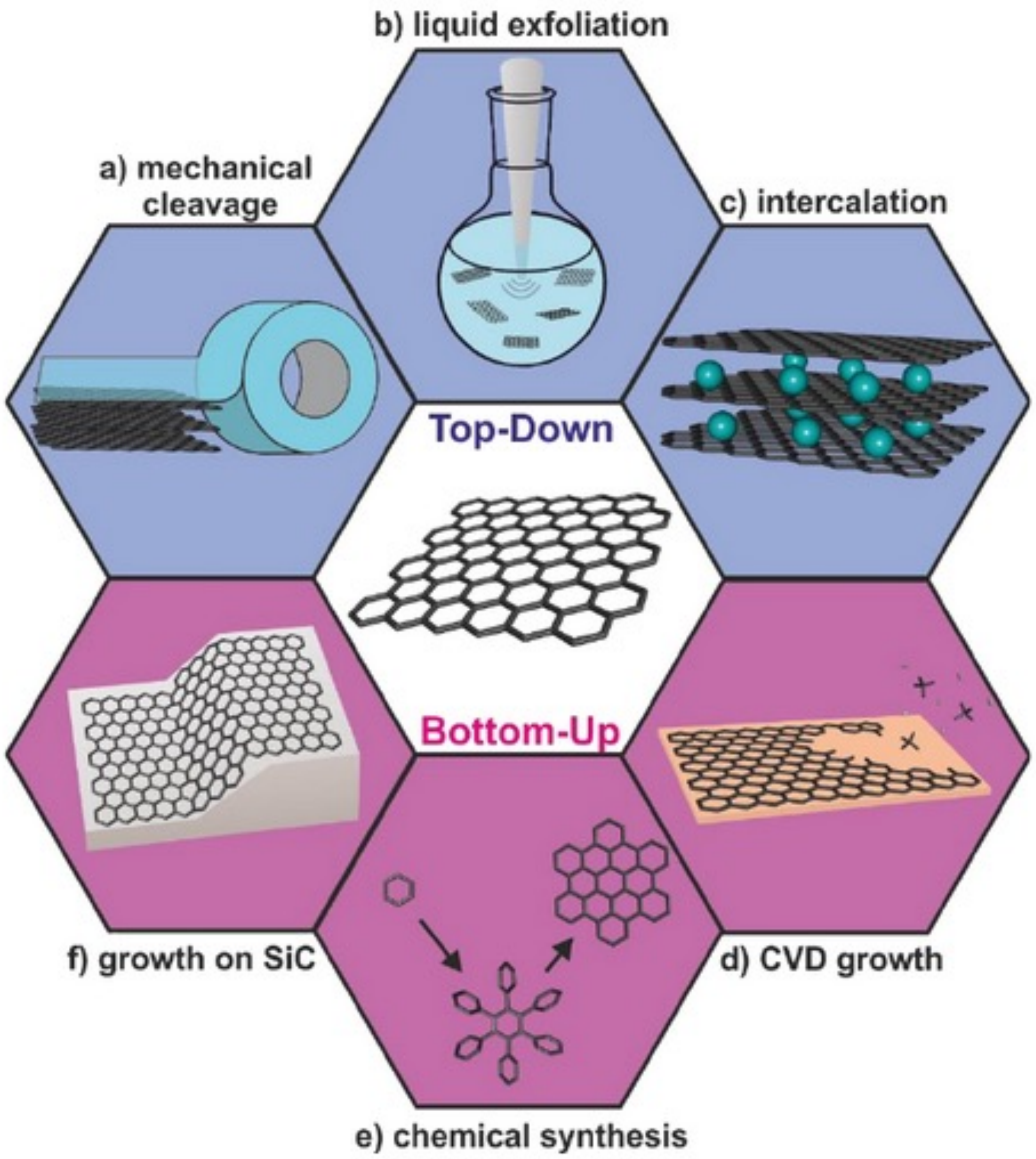
graphite



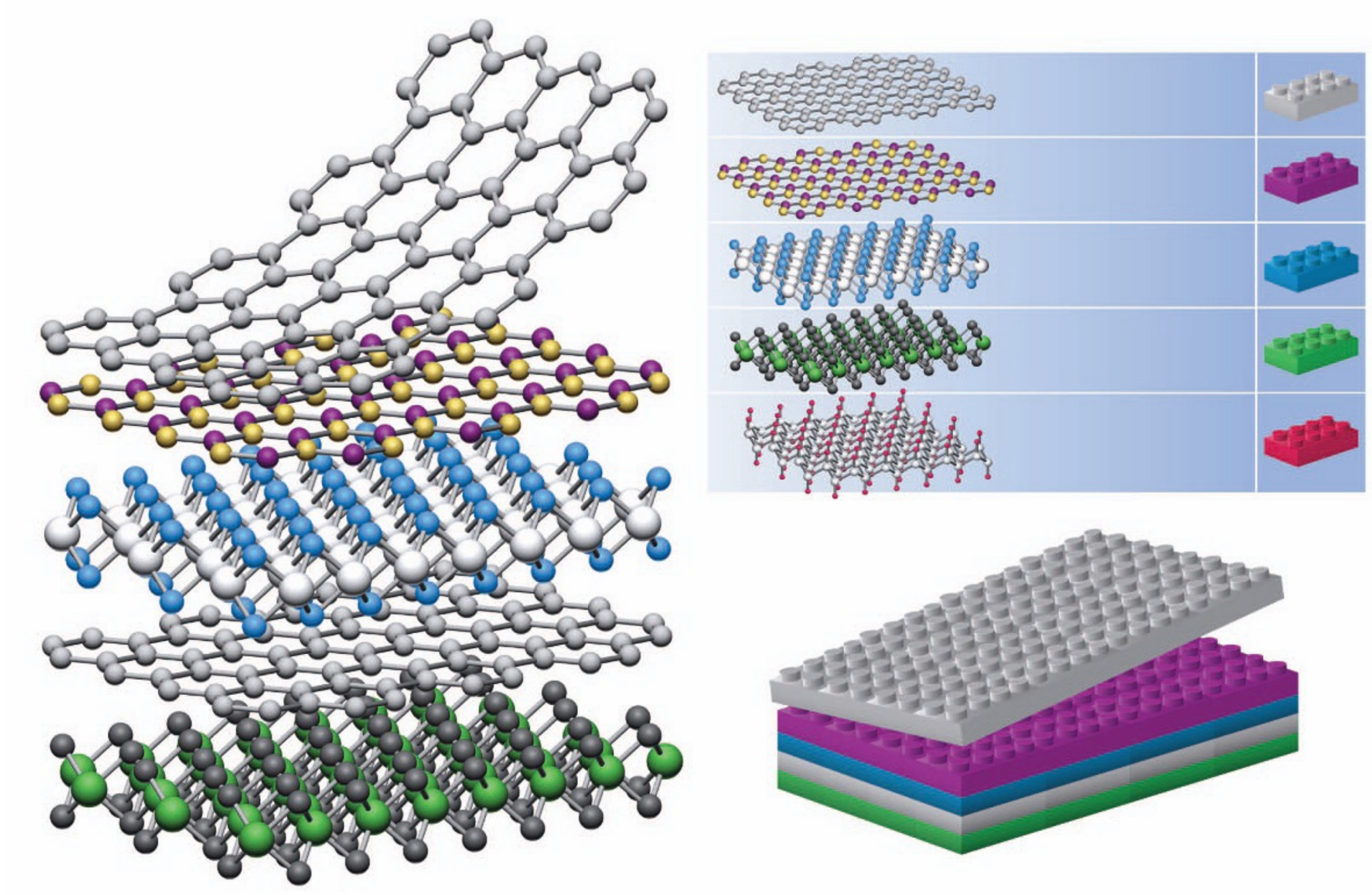


2D materials

graphene



van der Waals heterostructures

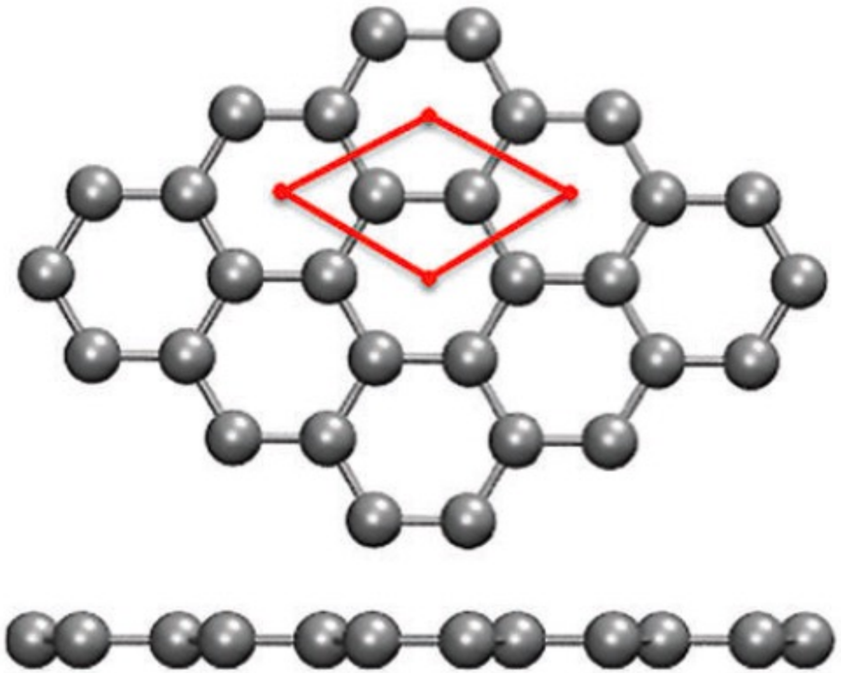


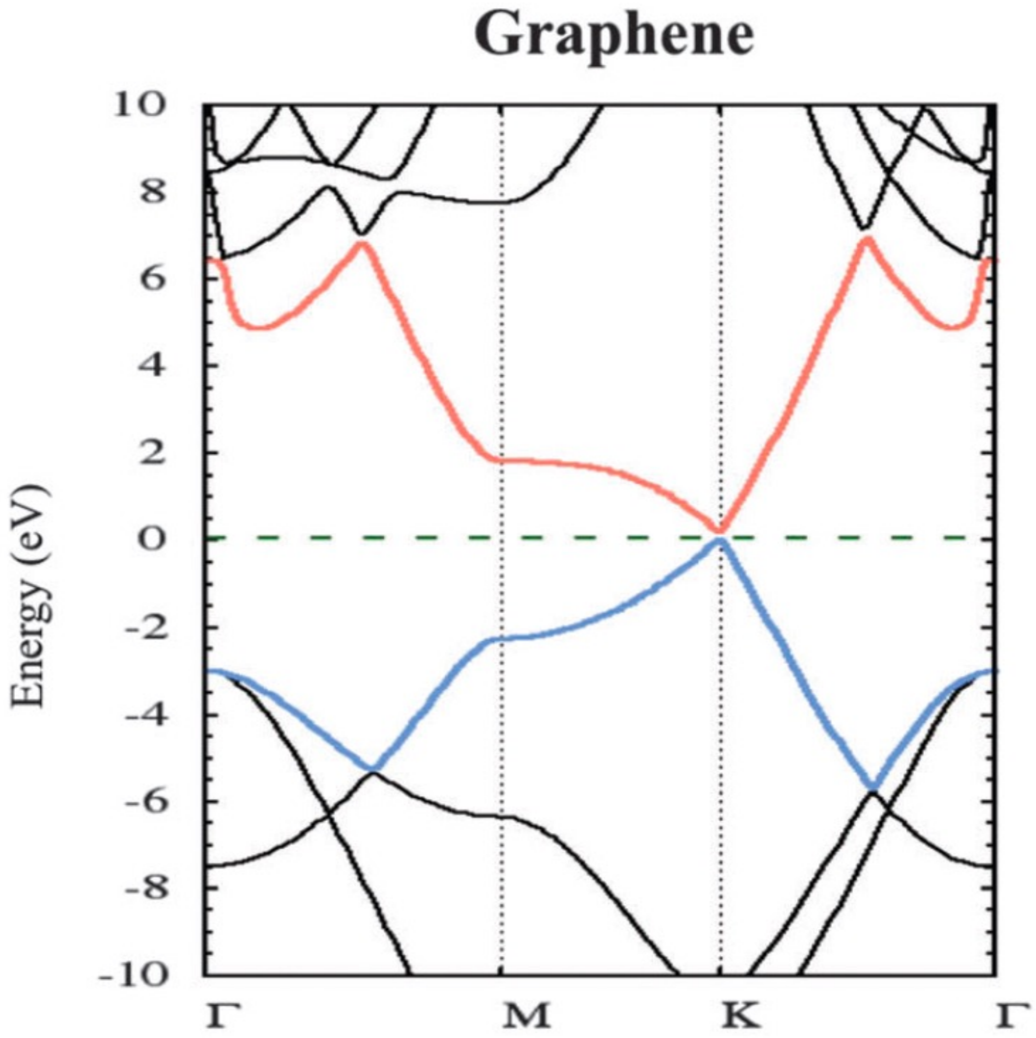
diodes
transistors
optoelectronics
spintronics

doi:10.1038/nature12385

An atlas of two-dimensional materials

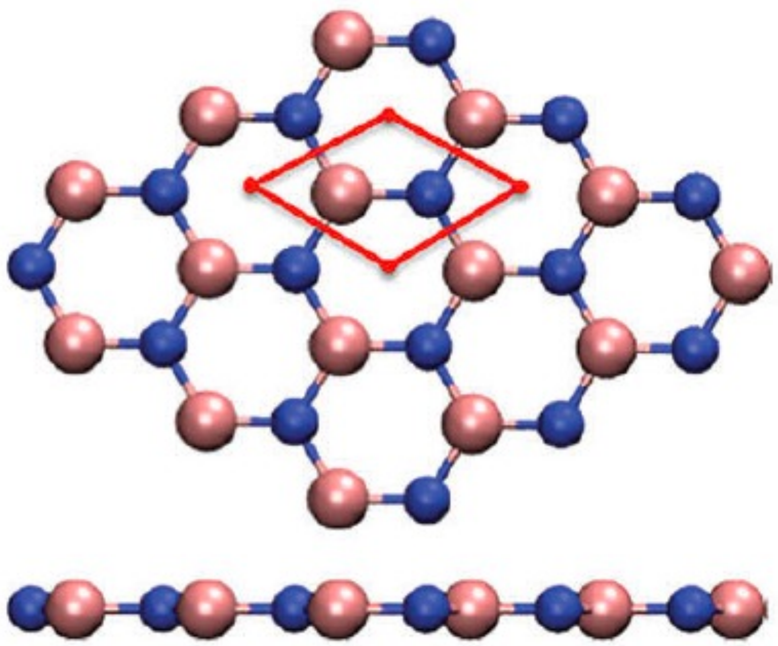
Chem. Soc. Rev., 2014, 43, 6537

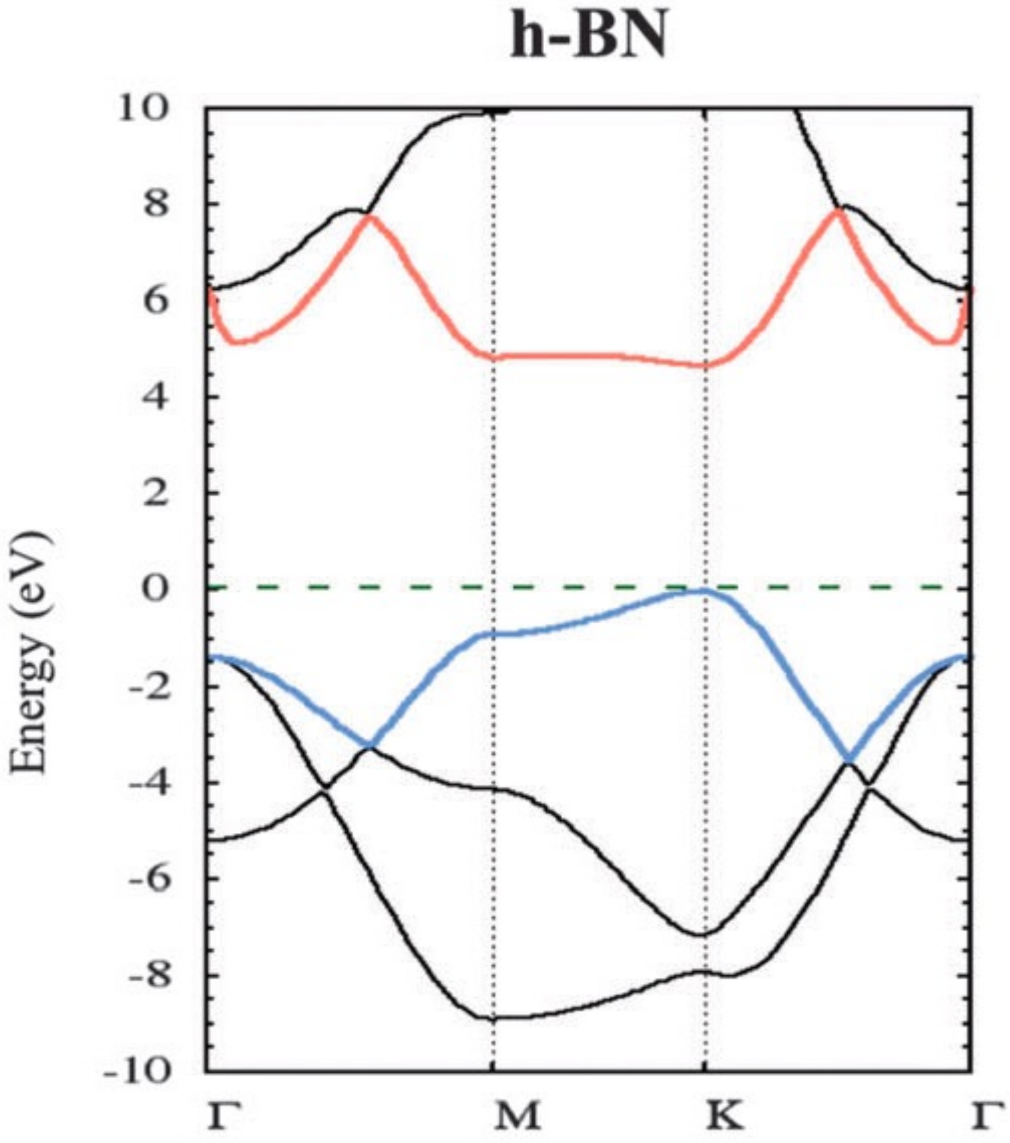




An atlas of two-dimensional materials

Chem. Soc. Rev., 2014, 43, 6537

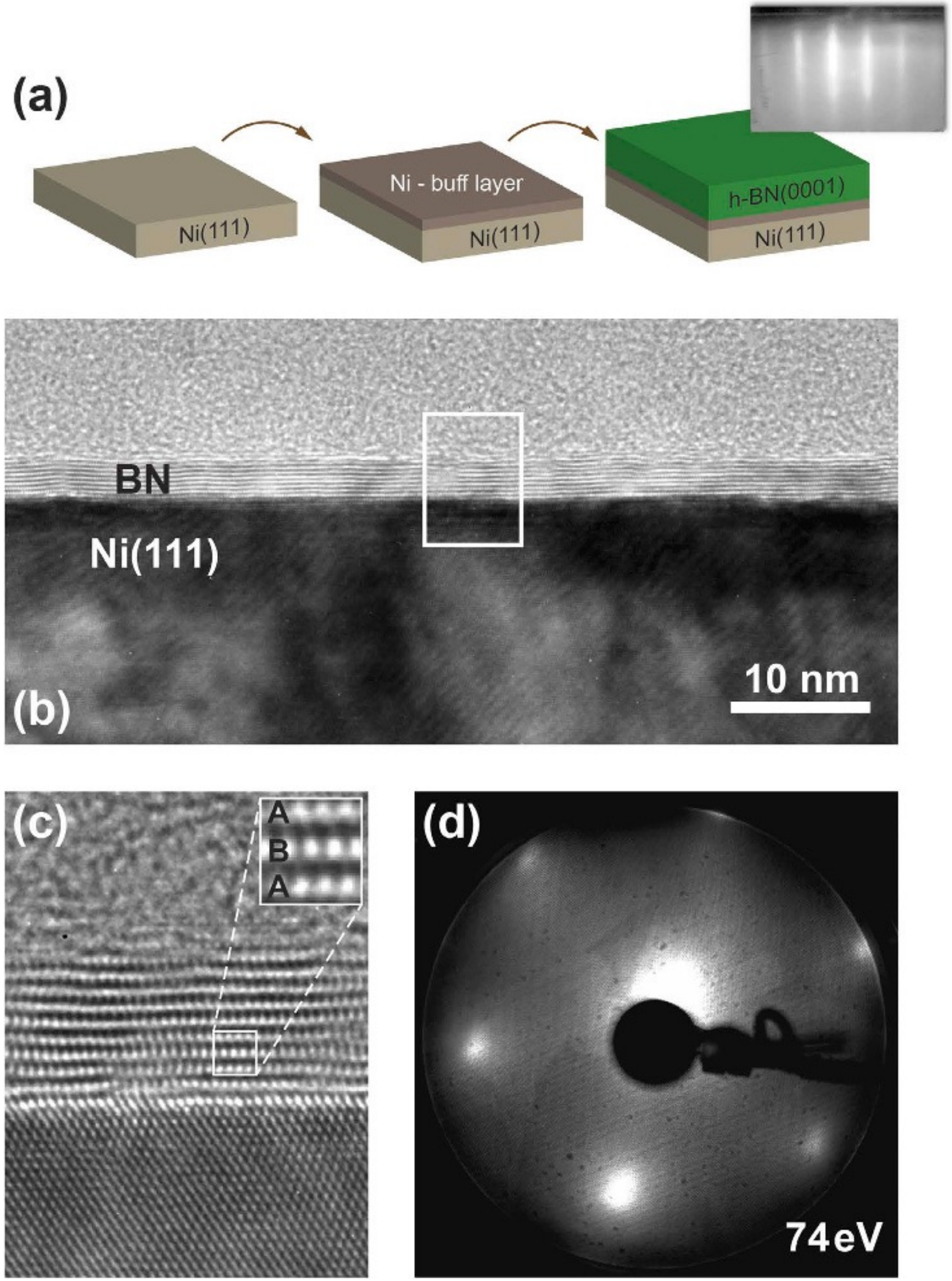




Structural and electronic properties of epitaxial multilayer h-BN on Ni(111) for spintronics applications

Scientific Reports 2016, 6:23547 DOI: 10.1038/srep23547

controlled growth of h-BN/Ni(111) by means of molecular beam epitaxy (MBE)



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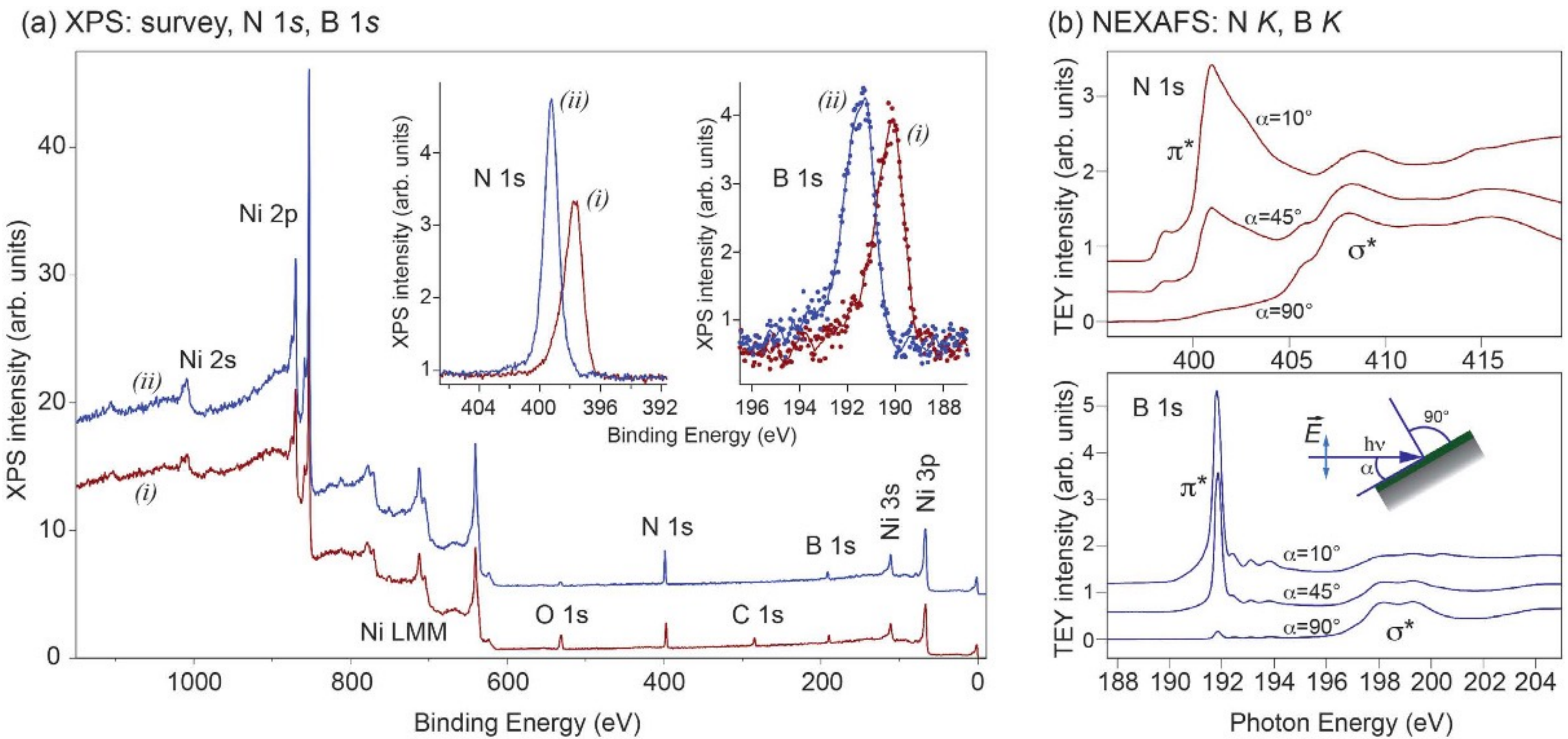

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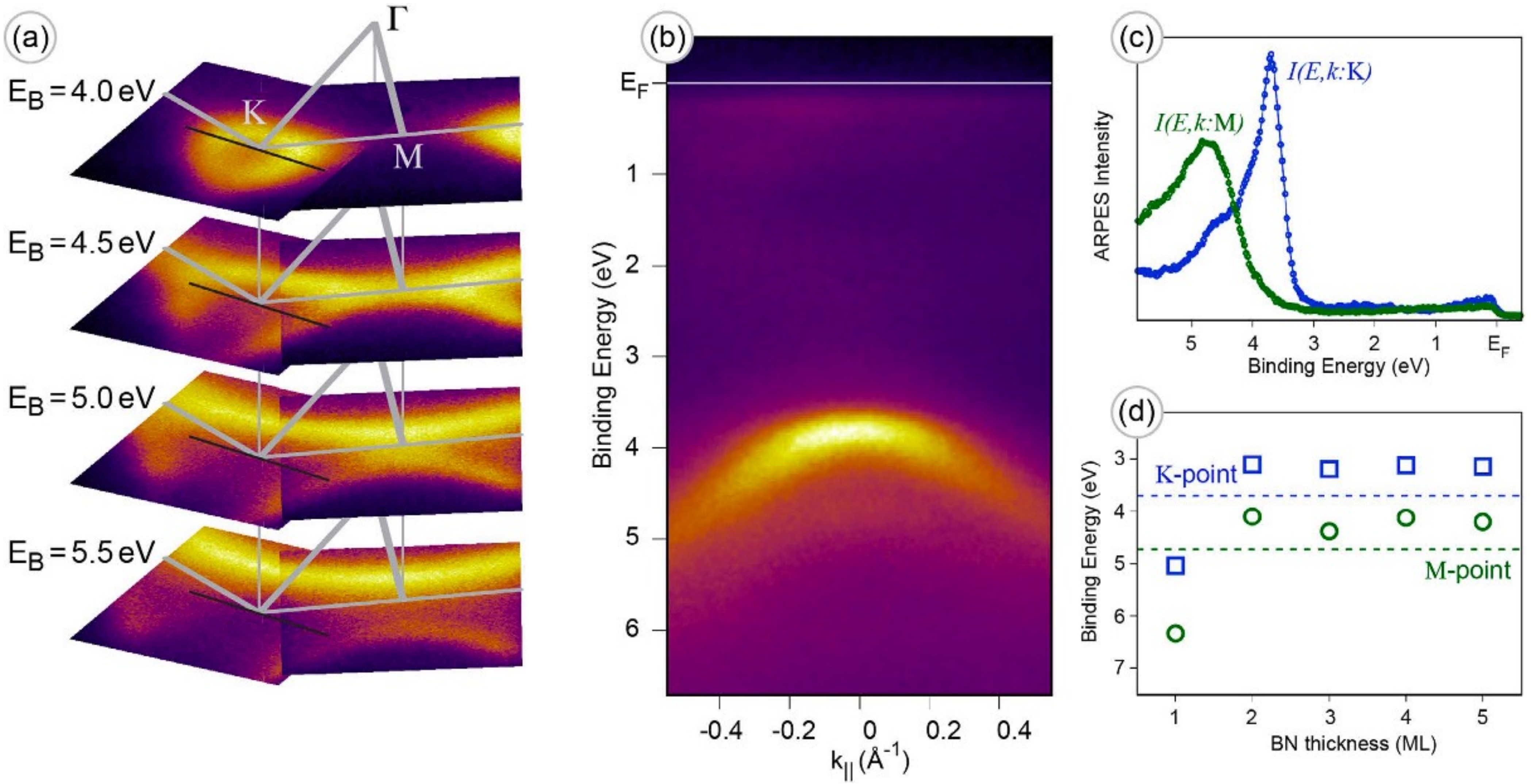
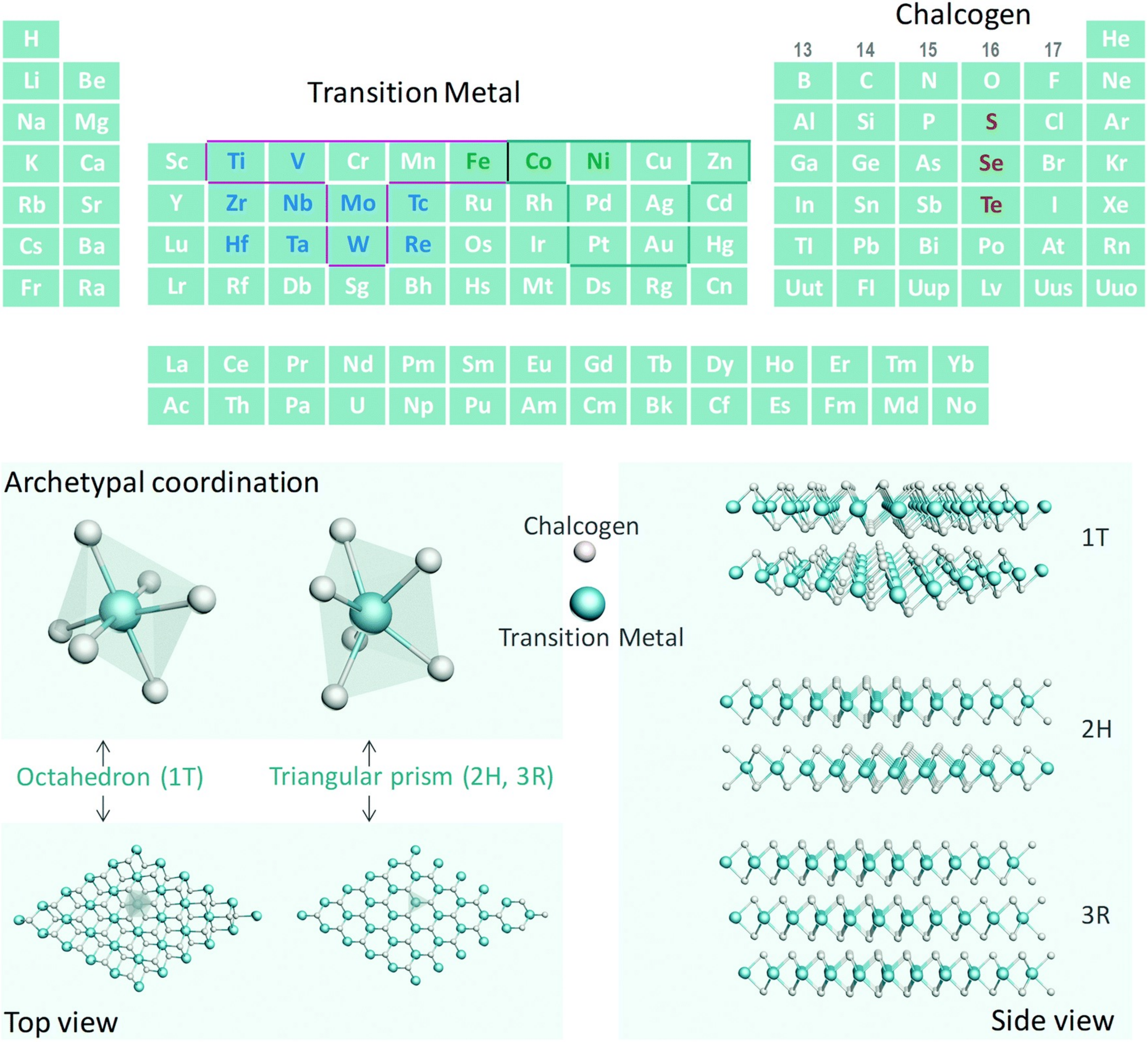


TMD-based highly efficient electrocatalysts developed by combined computational and experimental approaches

Chem. Soc. Rev., 2018, 47, 4332



An atlas of two-dimensional materials

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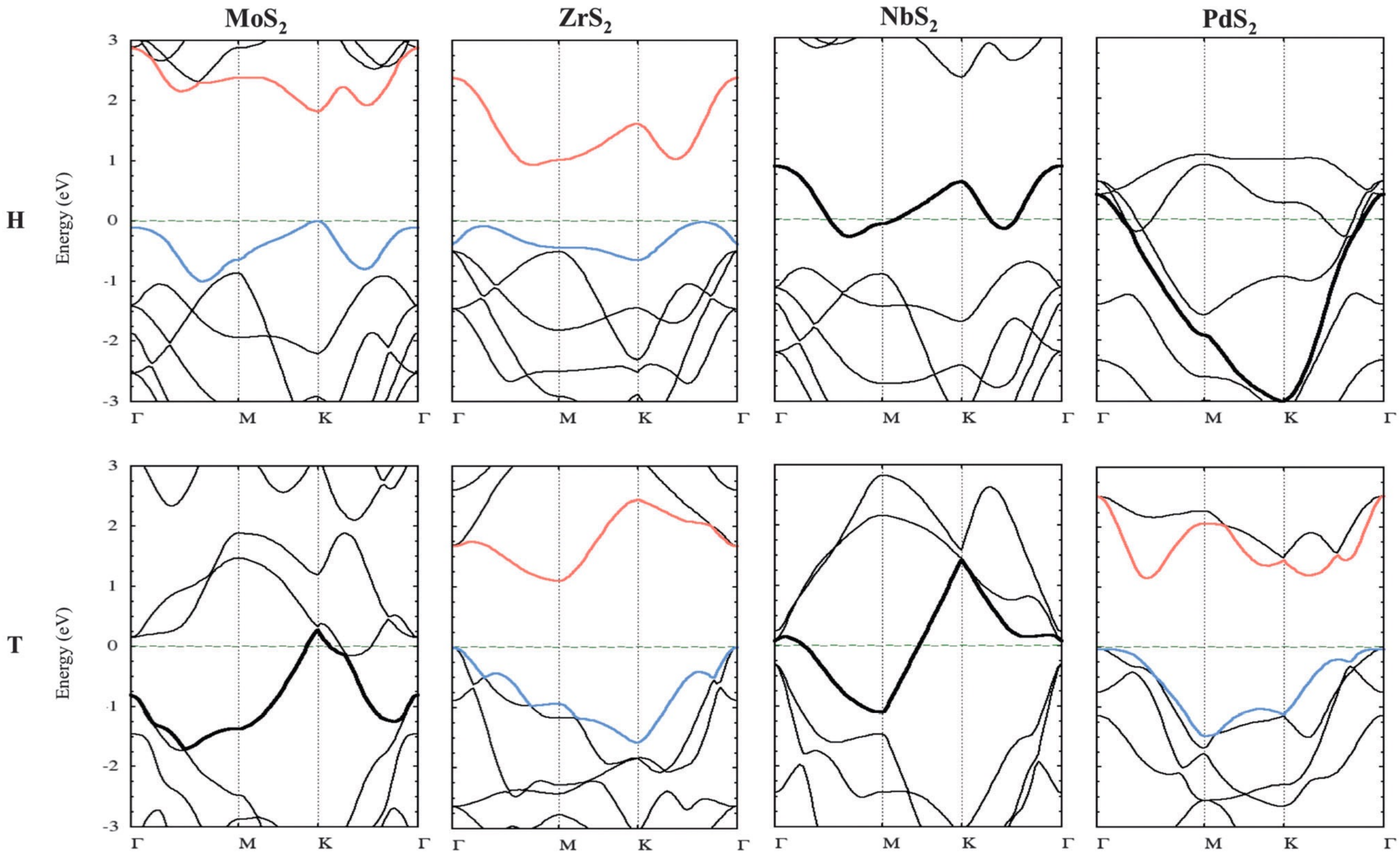
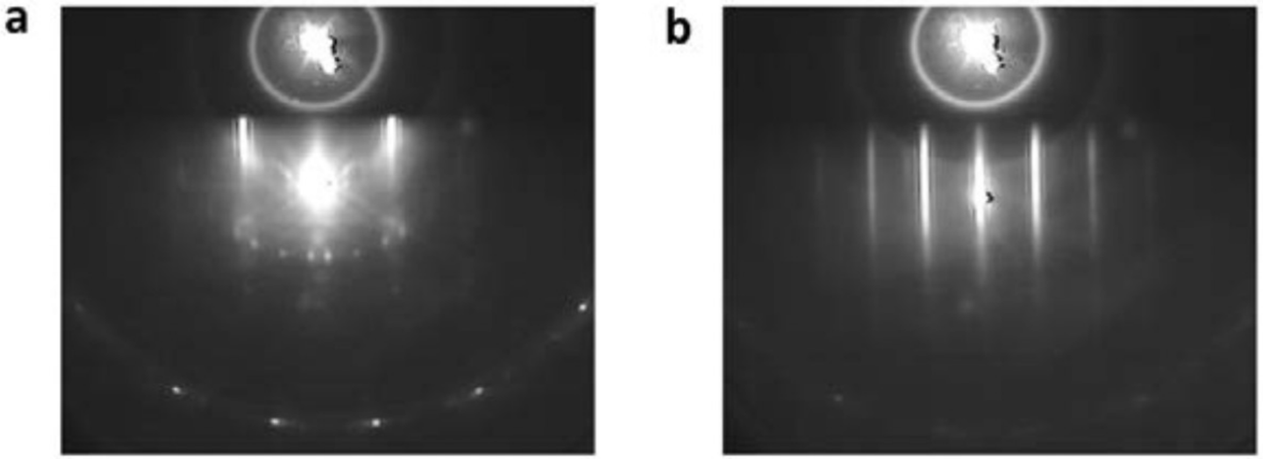


Giant bandgap renormalization and excitonic effects in a monolayer transition metal dichalcogenide semiconductor

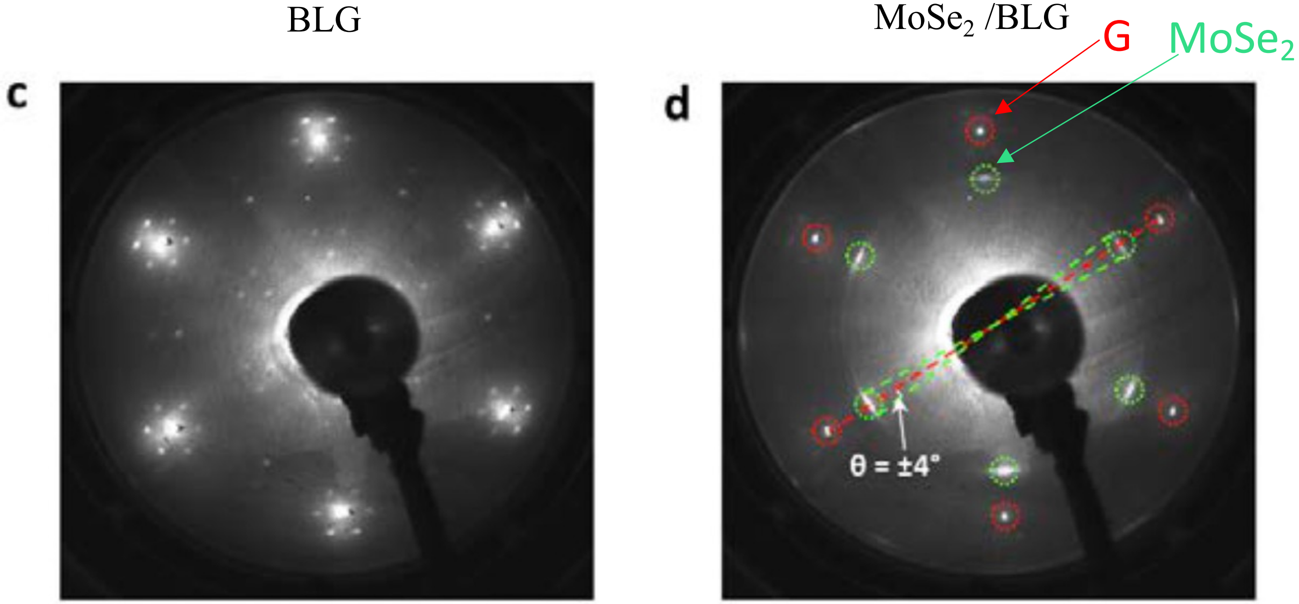
NATURE MATERIALS **13**, 1091 (2014) | DOI: 10.1038/NMAT4061

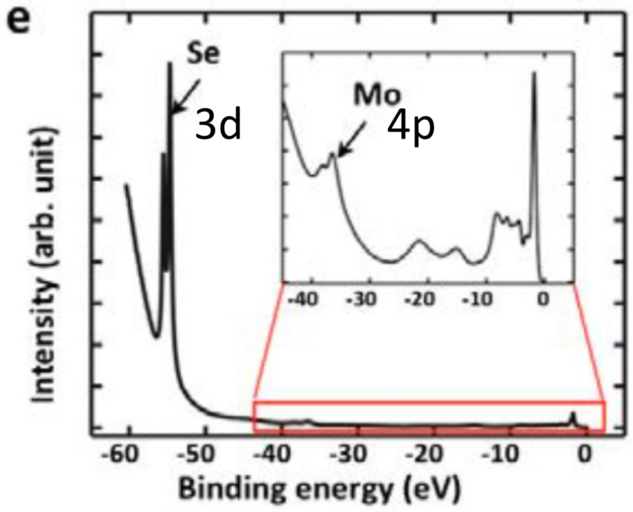
0.8 ML $MoSe_2$ grown on bilayer graphene (BLG) on SiC(0001)

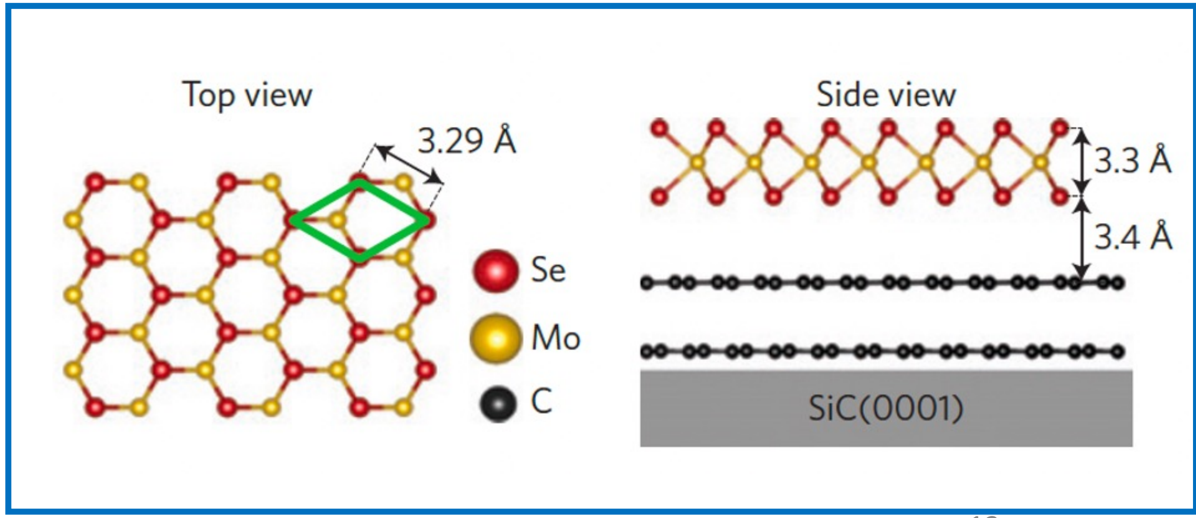


BLG

$MoSe_2$ /BLG







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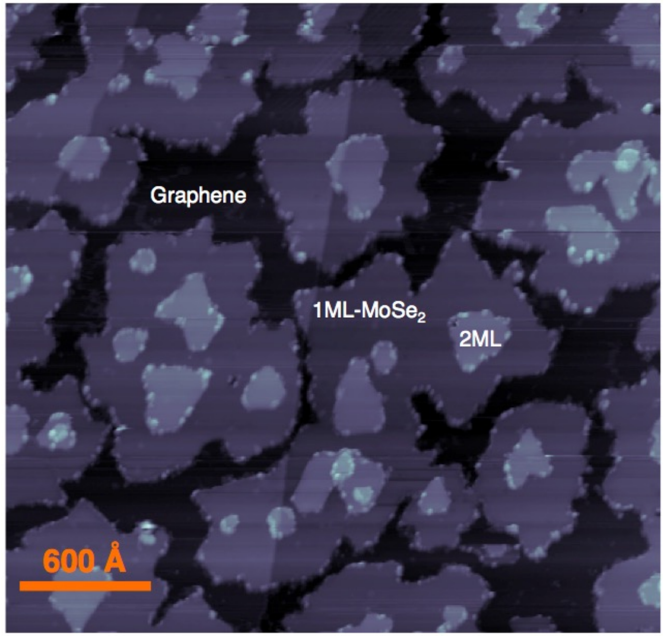
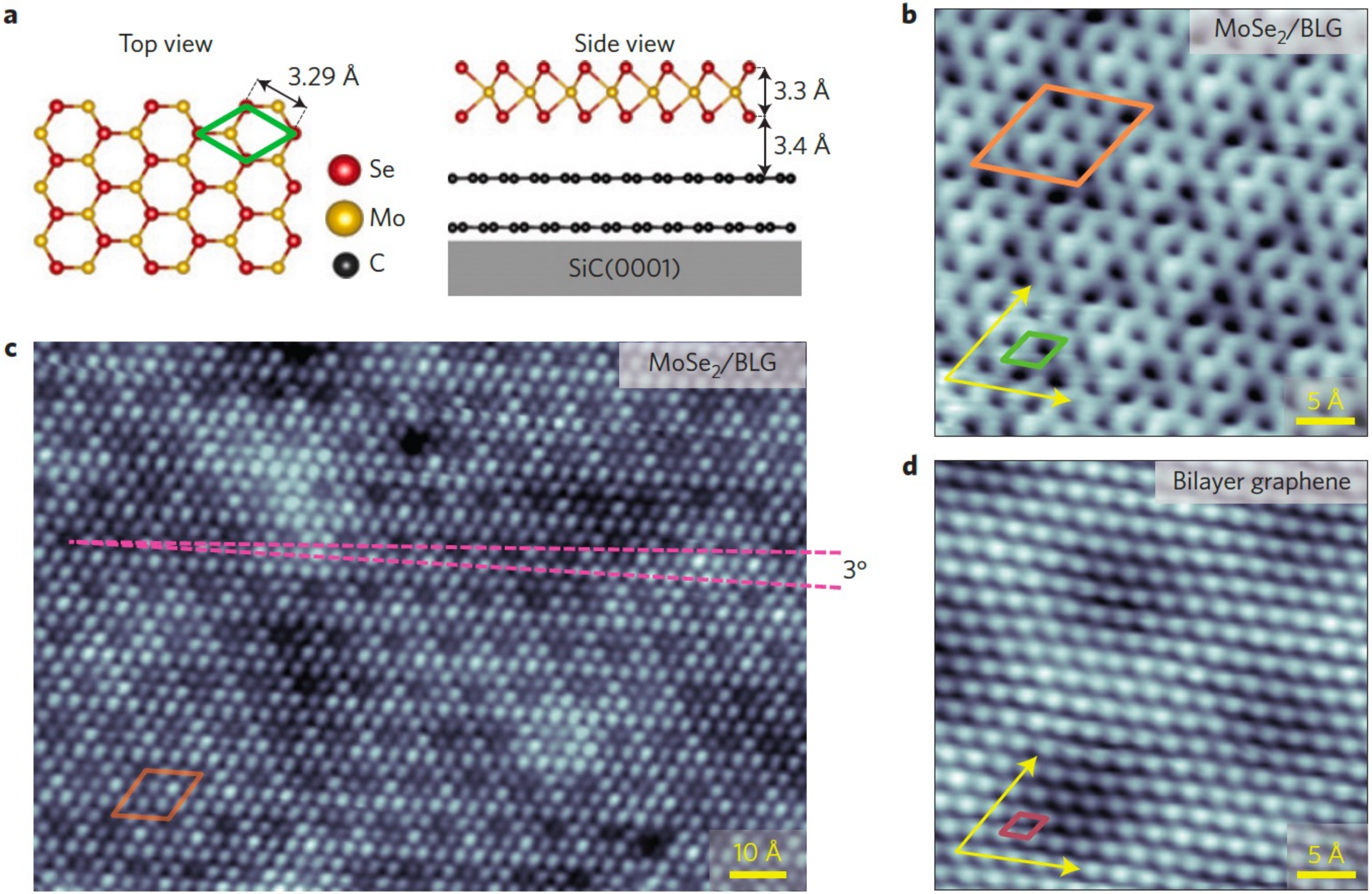
3 $MoSe_2$ unit cells
on 4 graphene ones



V = + 2.05 V, I = 30 pA, T = 5 K



9.7Å x 9.7Å
moiré pattern with an angle of 3° between the moiré pattern and the MoSe2 lattice (V= -0.9V, I=20 pA, T=5 K).

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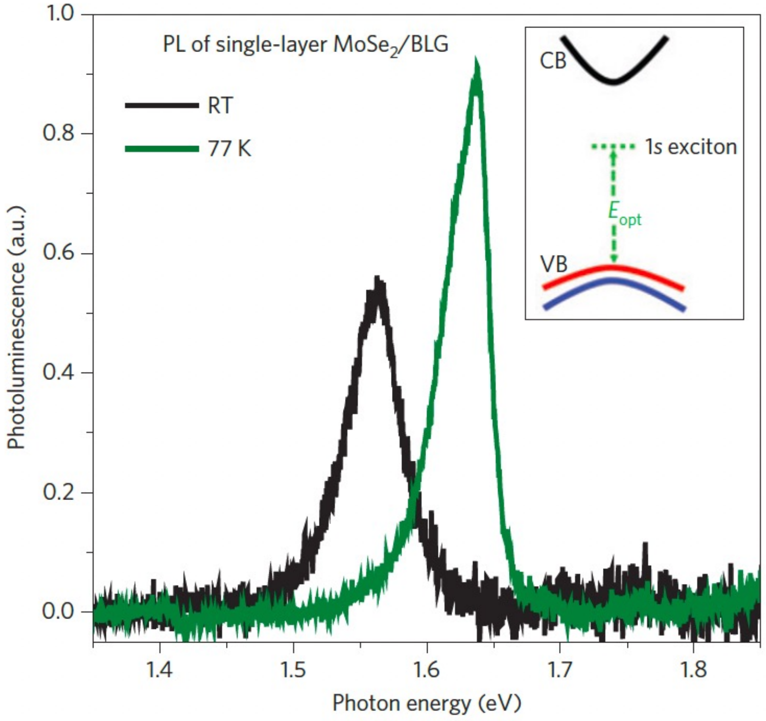

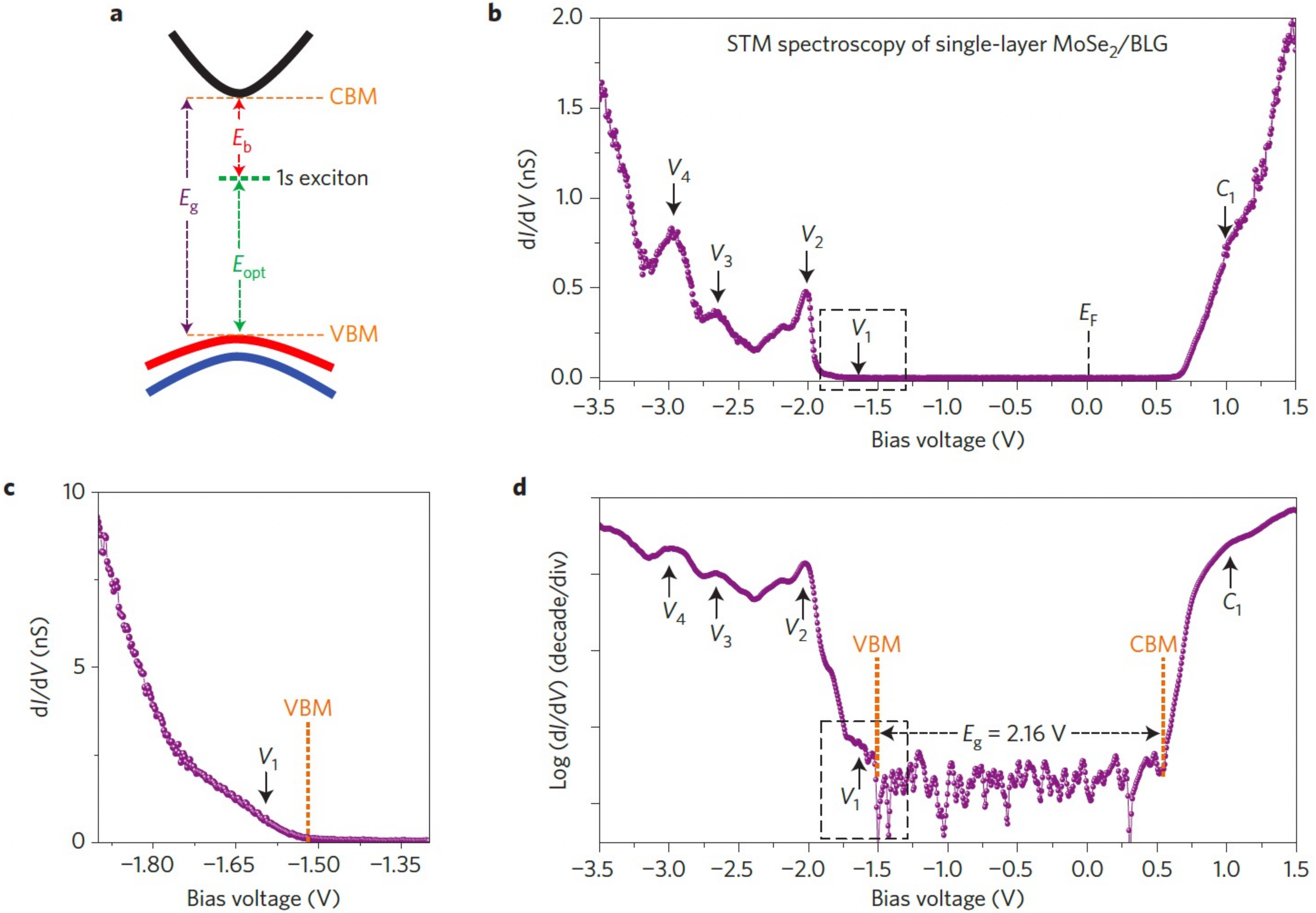

exciton: electron-hole bound state

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