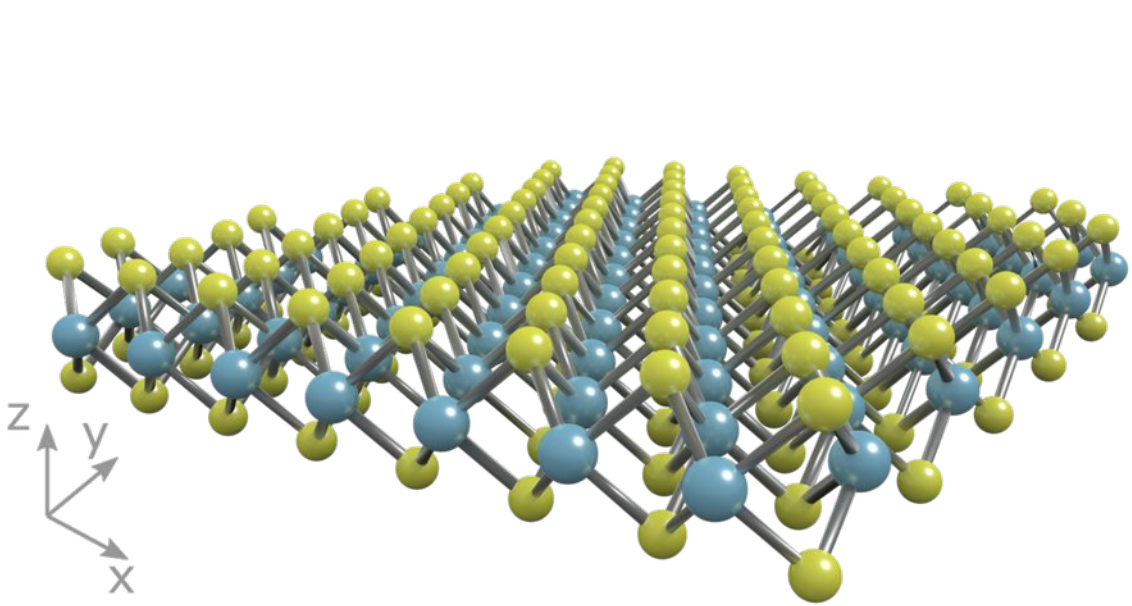
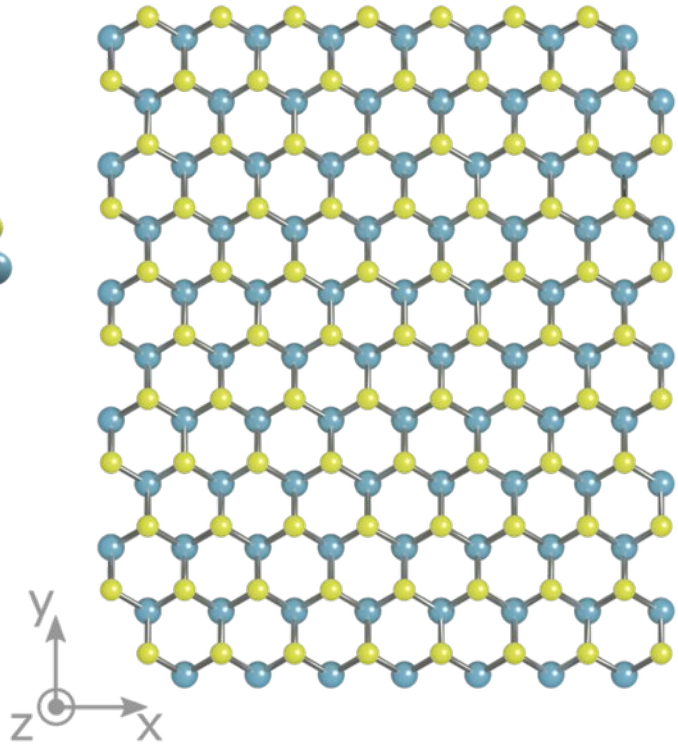
Φ – 575 Διάλεξη 04

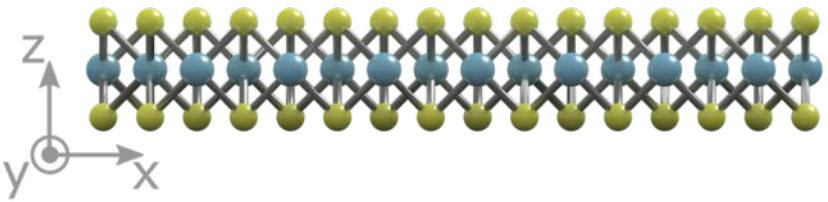
Φυσική διατάξεων δισδιάστατων ημιαγωγών

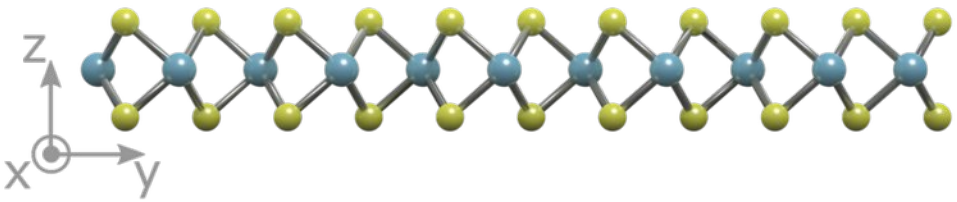
Γιώργος Δεληγεώργης (deligeo@physics.uoc.gr)

Properties of MoS_2









Stacking I

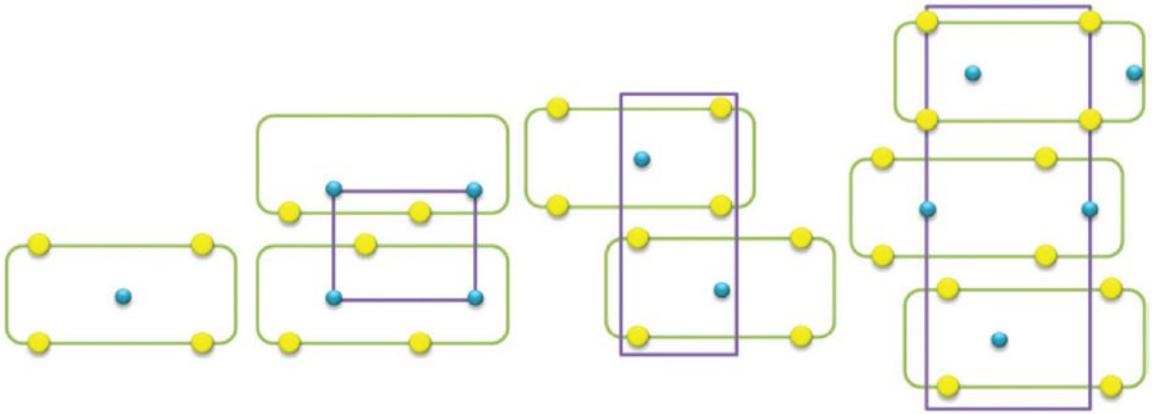
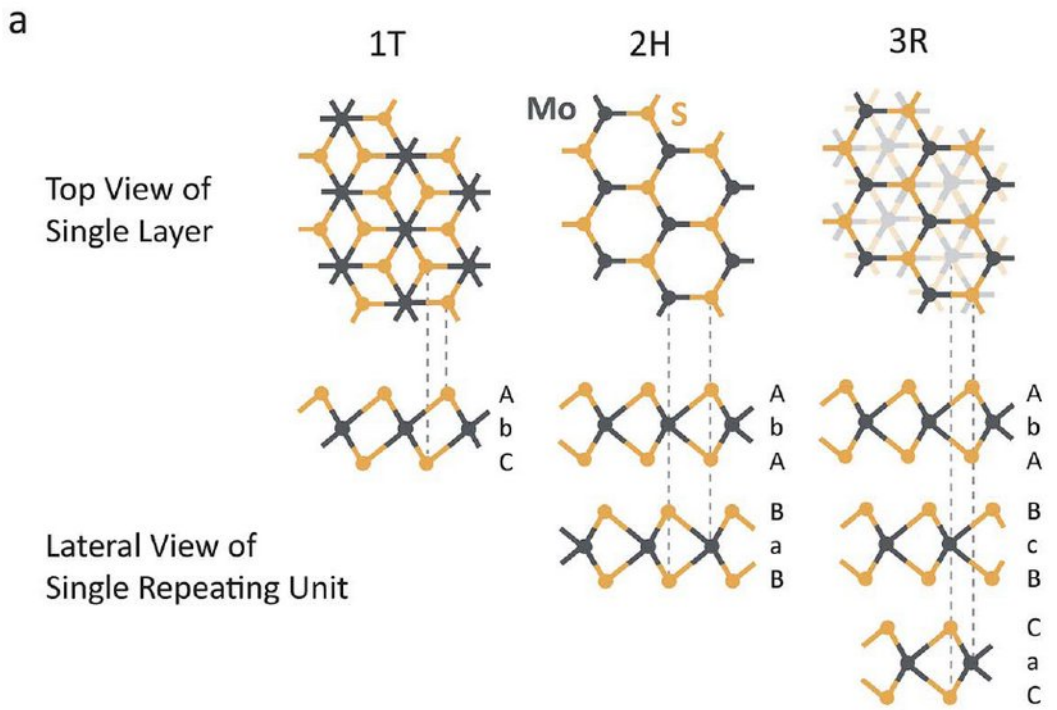
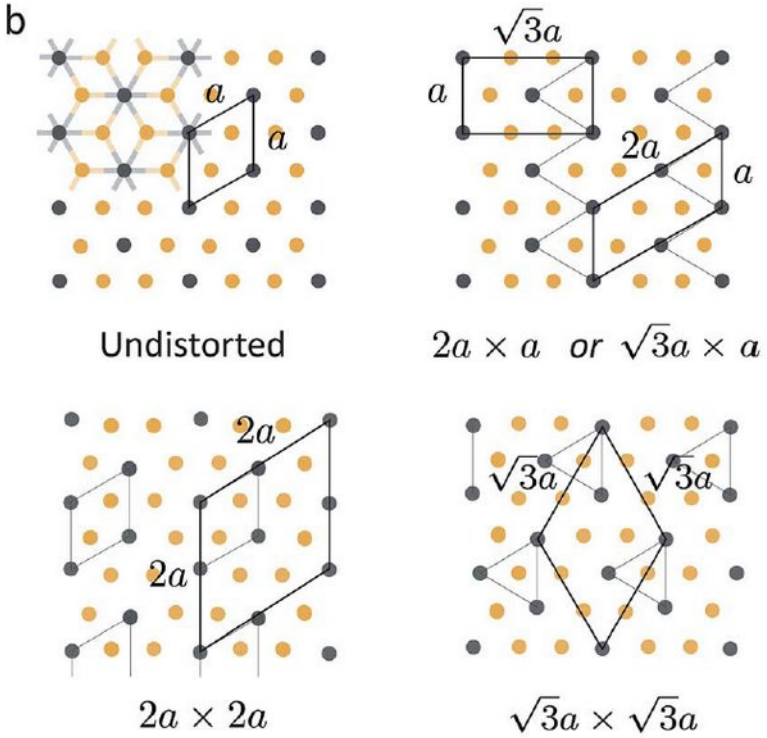


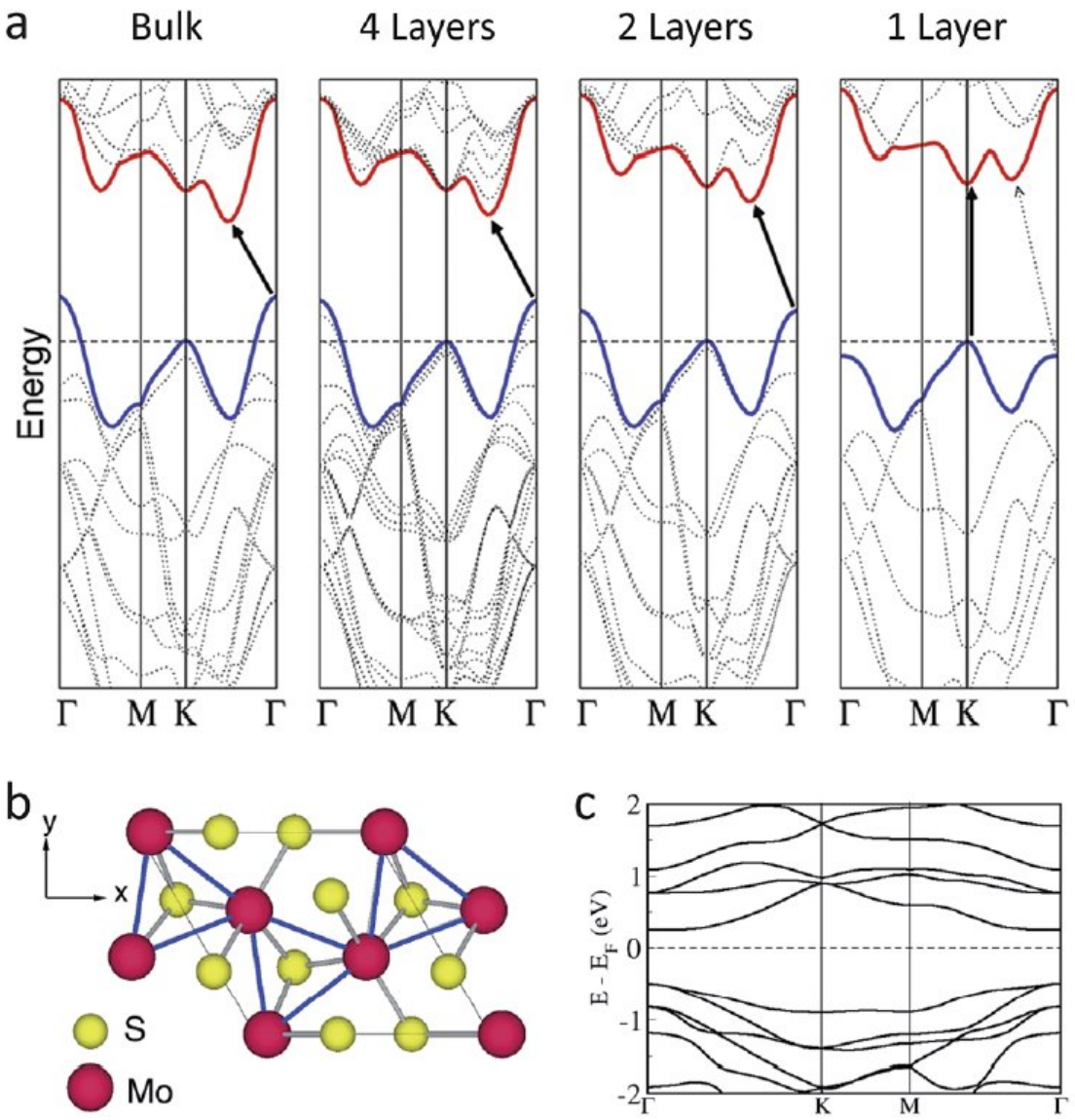
Fig. 12 Schematic drawing of common poly-types for MoS_2. The yellow dots represent Mo atoms and the blue dots represent S atoms. The green rectangles show a basic unit, while the purple rectangles represent a unit cell. Reproduced with permission from: ref. 136, Copyright 2002, Elsevier Science B.V.

Stacking II

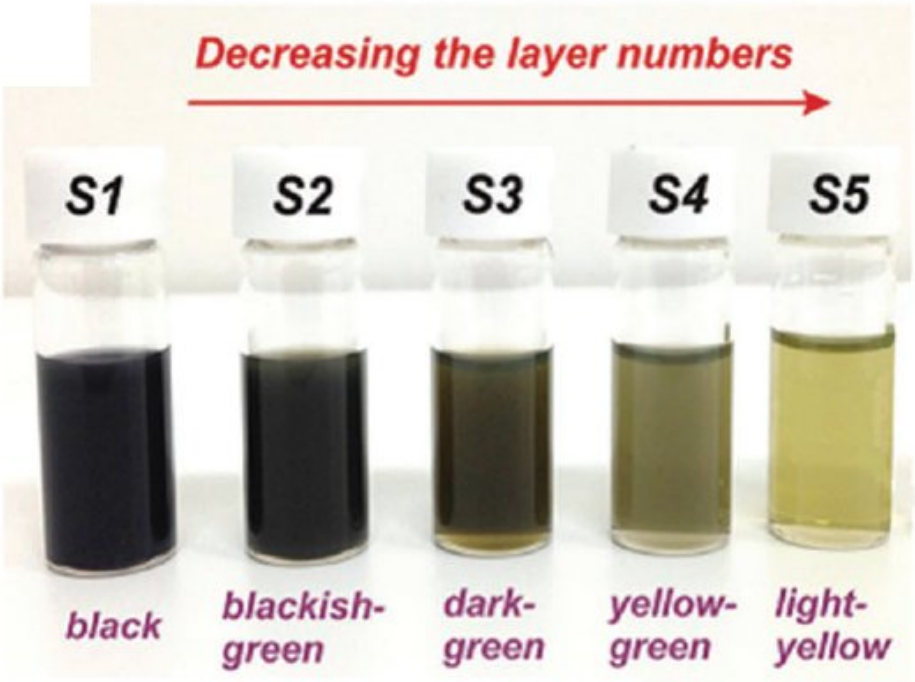

a
1T
2H
3R
Mo
S
Top View of
Single Layer
A
b
C
A
b
A
B
a
B
A
b
A
B
c
B
C
a
C
Lateral View of
Single Repeating Unit

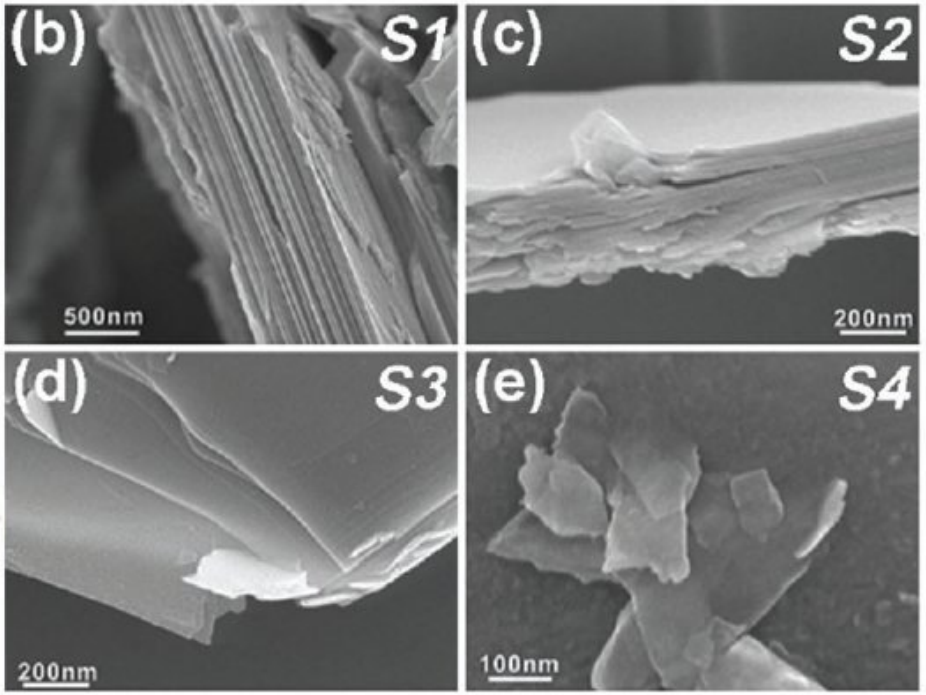

b
a
a
Undistorted
$\sqrt{3}a$
a
2a
a
$2a \times a$ or $\sqrt{3}a \times a$
2a
2a
$2a \times 2a$
$\sqrt{3}a$
$\sqrt{3}a$
$\sqrt{3}a \times \sqrt{3}a$

MoS_2 Band vs layers

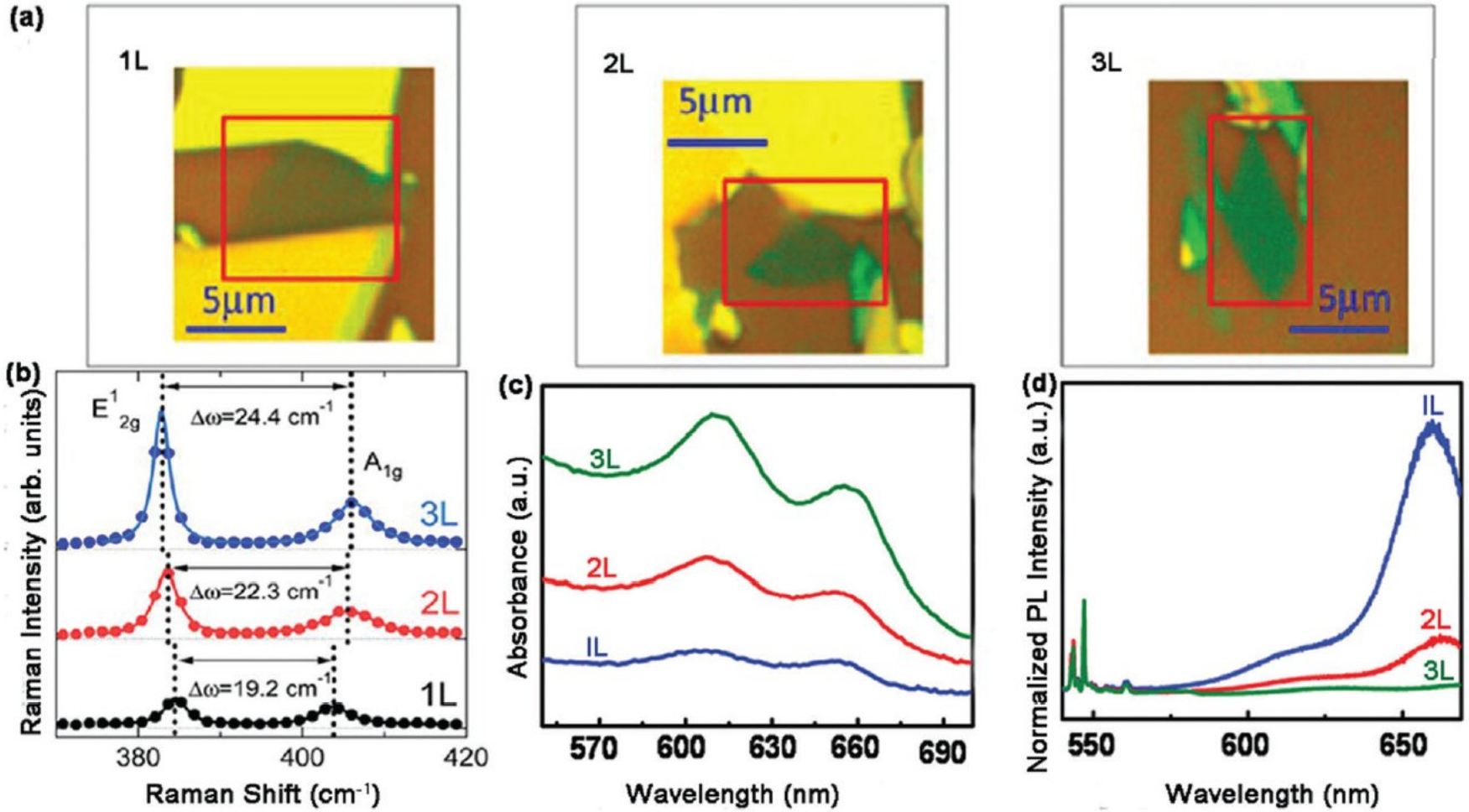


Absorption vs Layer number

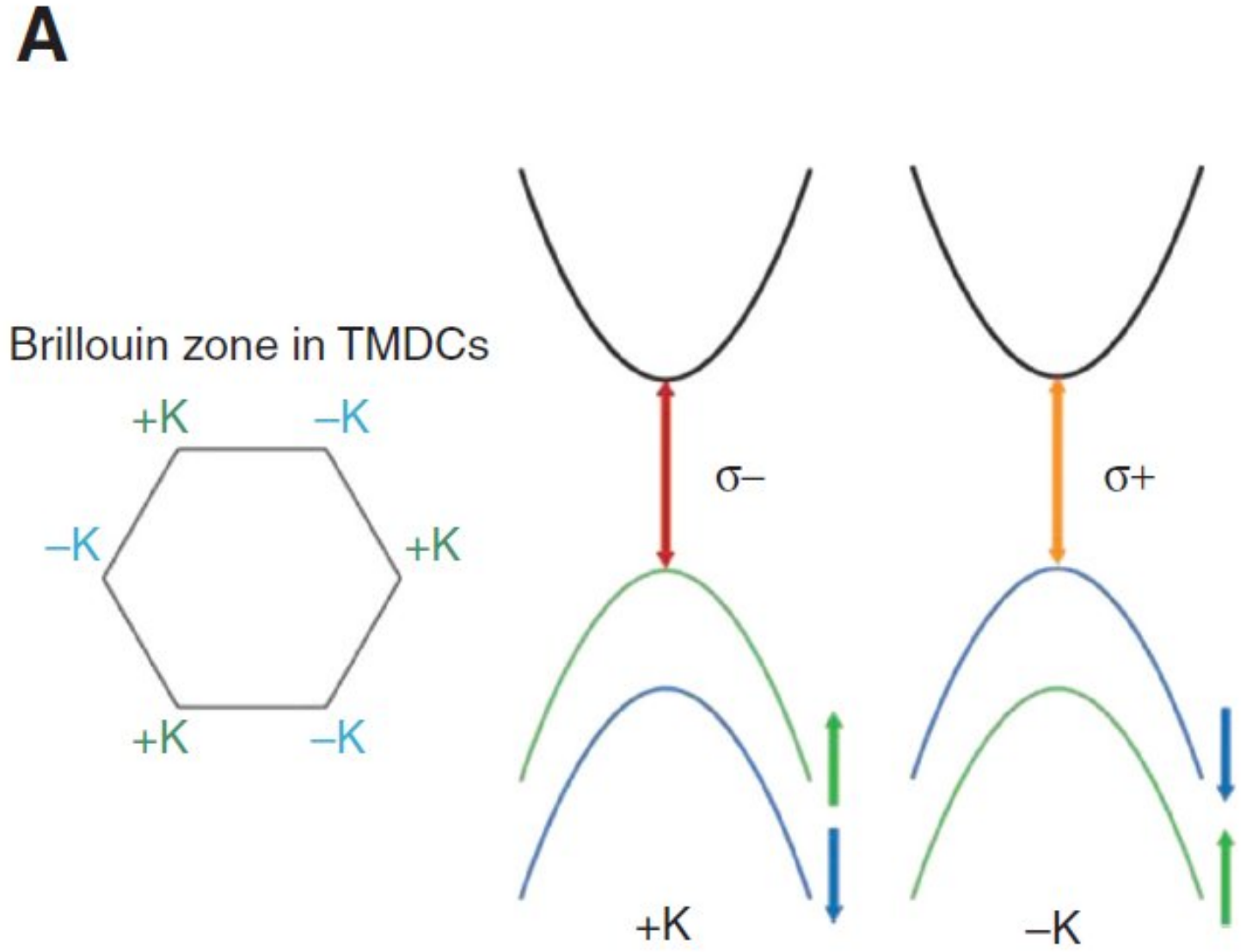




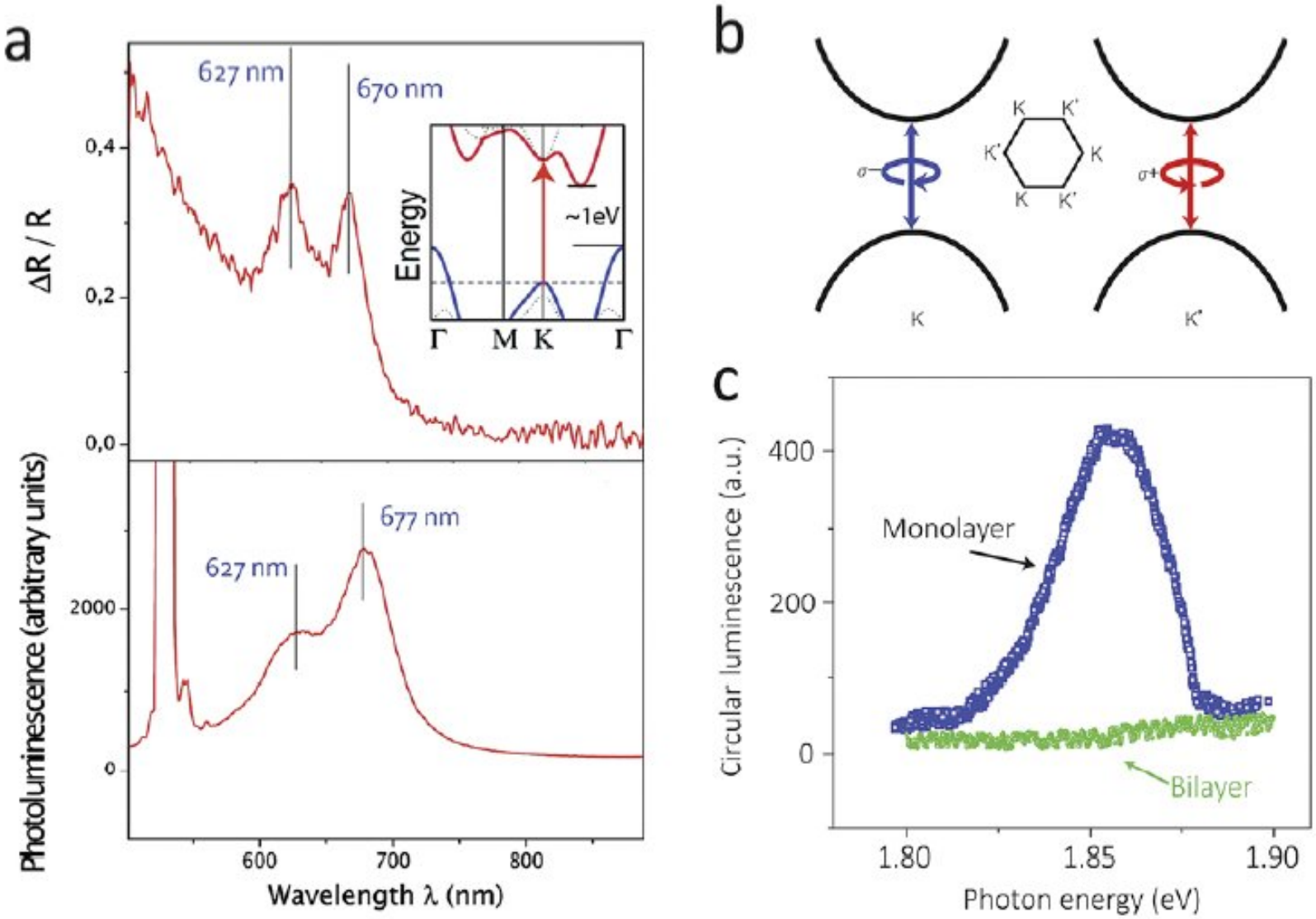
Raman on exfoliated MoS_2



TMDC band in K^+ and K^-



PL vs layers


a
627 nm
670 nm
ΔR / R
0,4
0,2
0,0
Energy
~1eV
Γ M K Γ
Photoluminescence (arbitrary units)
677 nm
627 nm
2000
0
600
700
800
Wavelength λ (nm)
b
K
K'
K'
K
K
K'
σ−
σ+
K
K'
c
Circular luminescence (a.u.)
400
200
0
Monolayer
Bilayer
1.80
1.85
1.90
Photon energy (eV)

Literature

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