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LaMeS – Layered structures of Metal Sulphides

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Aim and Purpose

- Sputtering of high quality novel 2D sulphide films.
- Primarily WS_2 , MoS_2, SnS_2 and combinations thereof.
- Study the influence of the energetic particle bombardment onto the proposed 2D-materials.
- Characterize and evaluate the sputtered 2D-materials films from a fundamental standpoint.

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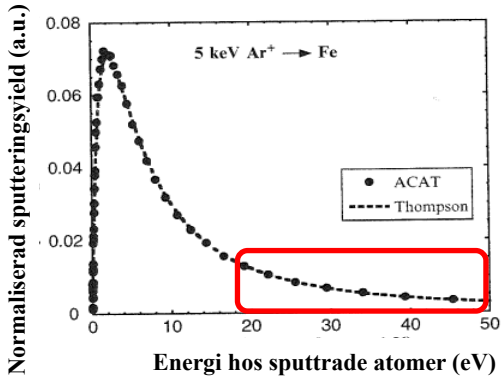
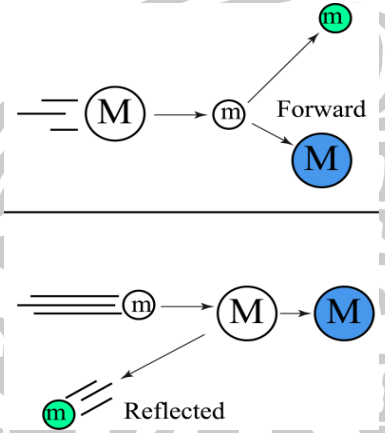
Energetic Particles during Sputter Deposition

Sputtered atoms of high energy



Reflected Ar from the target



Negative ions from the target

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Sputtring onto Sensitive Substrates – Graphene, MoS_2 and WS_2

The energy threshold for defect formation:

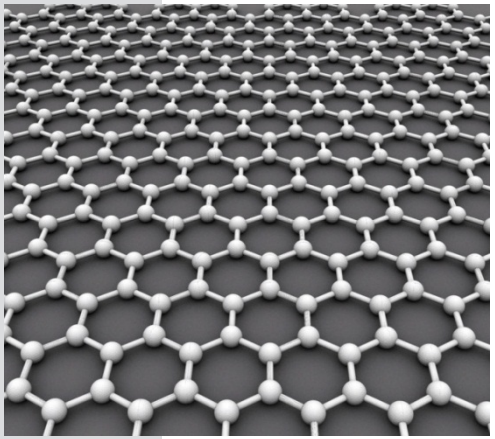
Graphene defects: P. Ahlberg, et al., APL Materials 4, 046104 (2016)

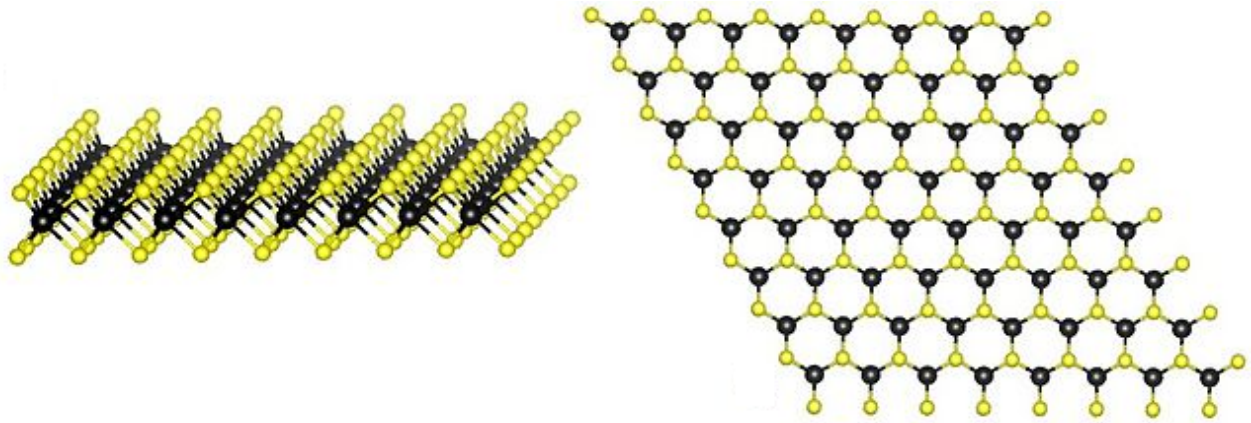
WS_2 on Graphene: F. O. L. Johansson, et al., Appl. Phys. Lett. 110, 091601 (2017)

~33 eV for Ar onto graphene[1]

~ 8 eV for MoS_2 [2]

~ 7 eV for WS_2 [3]





A hexagonal WS_2 or MoS_2 monolayer,
W or Mo (black) and S (yellow) (left).
A WS_2 or MoS_2 monolayer from above (right).

[1] Chen et al. APL 103 (2013) [2] Muratore et al. APL 104 (2014) [3] Wang et al Phys.Chem.Chem.Phys.(2015)

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- Where are Sn and W in the structure?
- Combine other 2D-materials; WS_2 + MoS_2, SnS_2 + MoS_2, WS_2 + MoS_2, + SnS_2
- What is the thinnest possible fully covering film?
- What is the thickest film still having epitaxial structure ?
- What is the processing window with respect to temperature and processing pressure ?