

# The 12<sup>th</sup> Korea-U.S. Forum on Nanotechnology Magnetic anisotropy assaying controllable defects in MoS<sub>2</sub> single crystal



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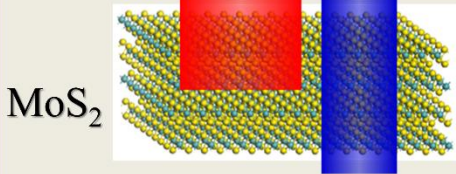
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## Controllable defects

### e-beam (Energy & Dose)

Low E High D      High E Low D



Defective area

Dose

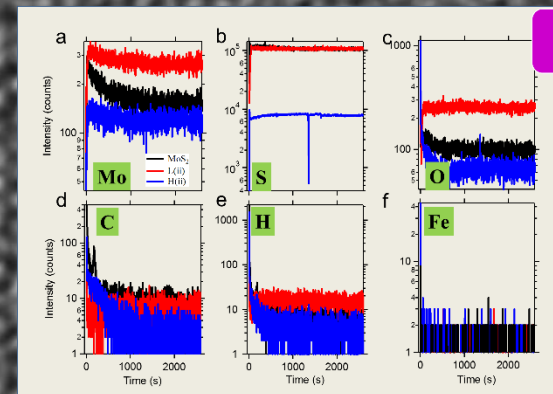
Defective depth

Energy

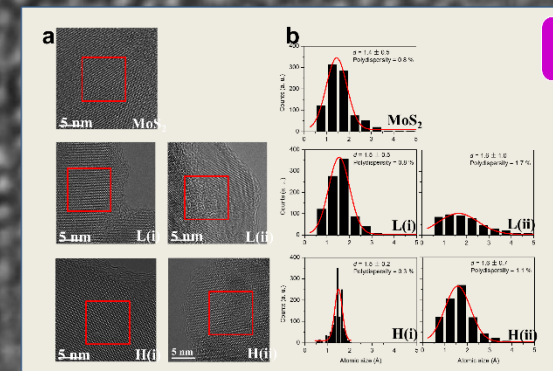
**Table I | Condition of electron irradiation.**

MoS<sub>2</sub> samples were irradiated by the electron beams with different doses (kGy) and two accelerating voltages (E<sub>a</sub>), i.e., low energy [0.7 MeV, L(x)] and high energy [2.0 MeV, H(x)]. Ne indicates the number of electron per area (cm<sup>2</sup>).

Sample	Dose	N <sub>e</sub>	E <sub>a</sub>
L(i)	150	3.35 × 10 <sup>14</sup>	0.7
L(ii)	300	6.70 × 10 <sup>14</sup>	
L(iii)	600	1.39 × 10 <sup>15</sup>	
H(i)	100	1.58 × 10 <sup>14</sup>	2.0
H(ii)	250	3.94 × 10 <sup>14</sup>	



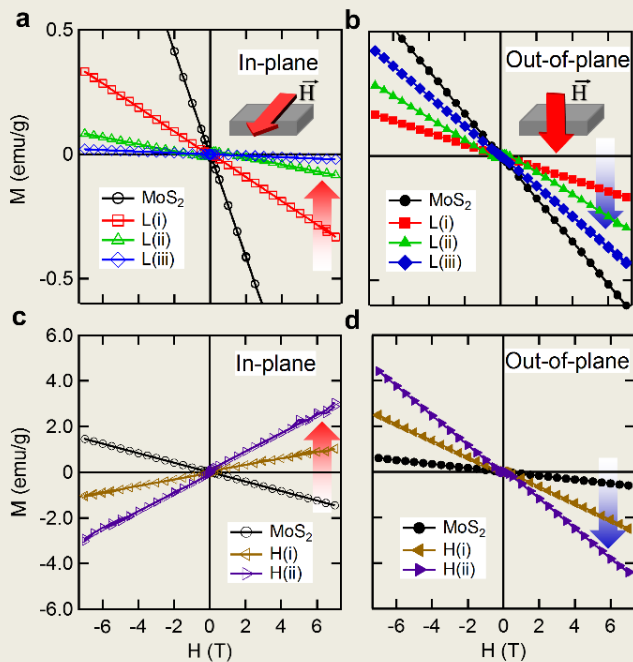
SIMS



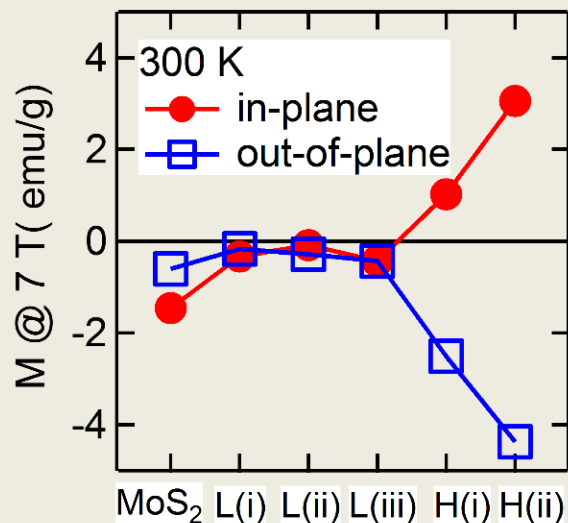
TEM

Oct. 06, 2015

# Magnetic anisotropy



Quantify defects

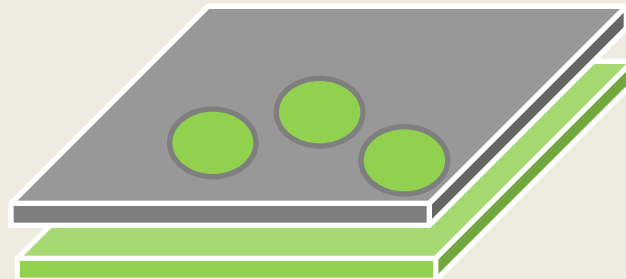
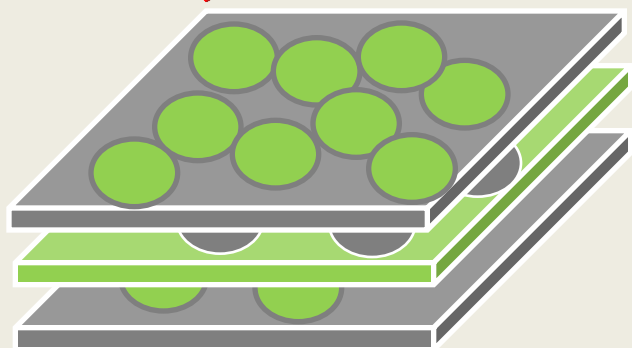
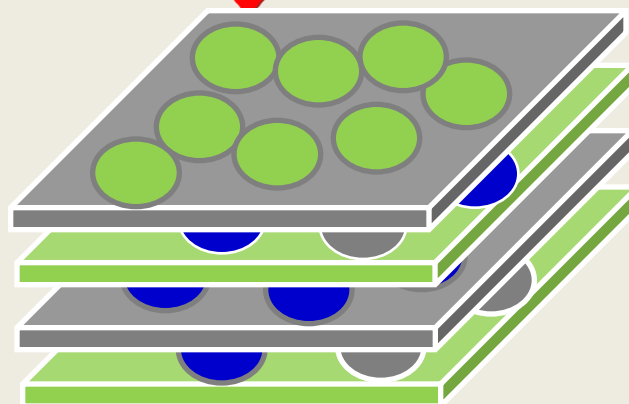


Paramagnetism

Defective area

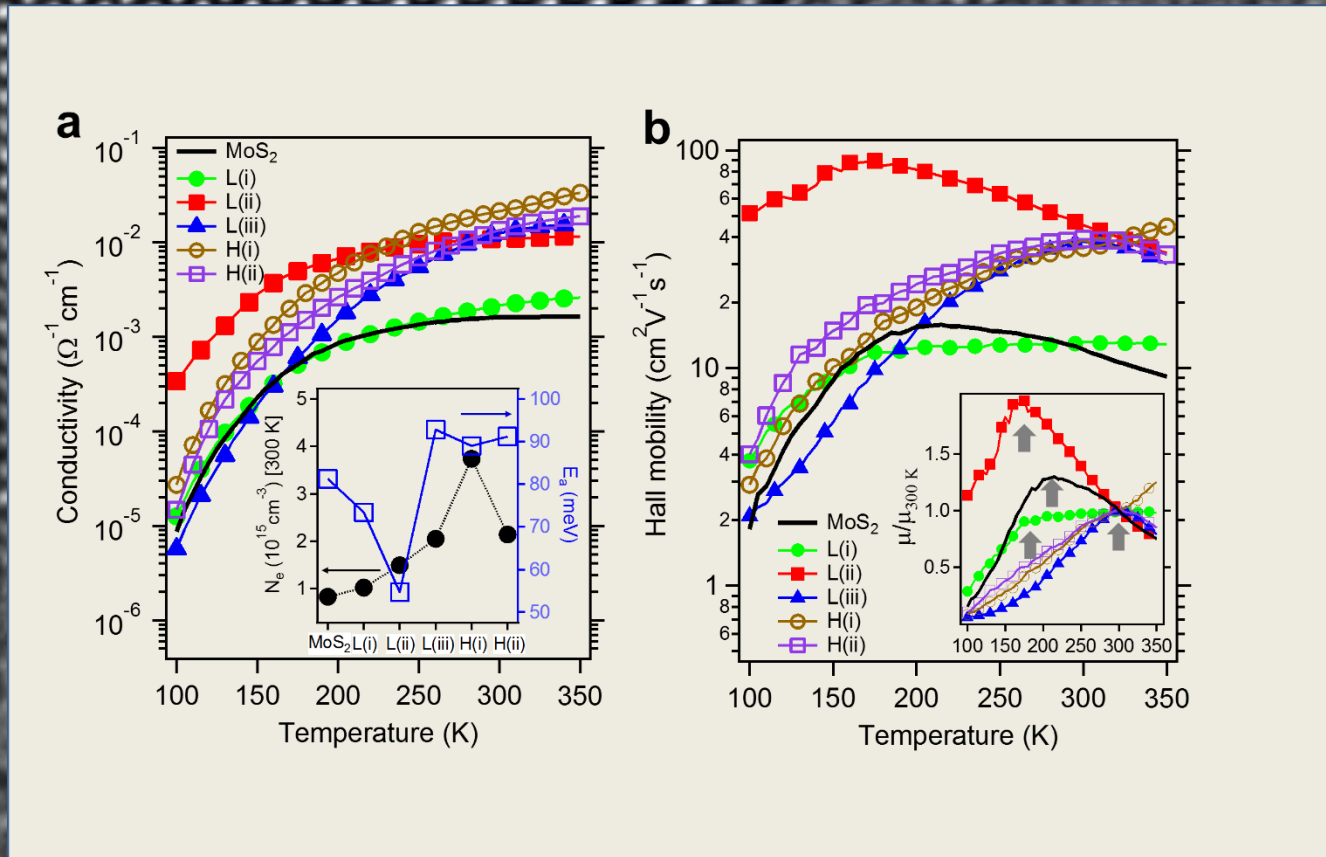
Defective depth

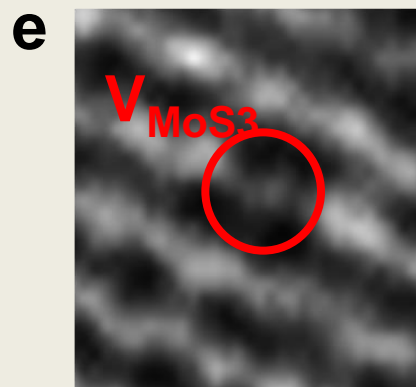
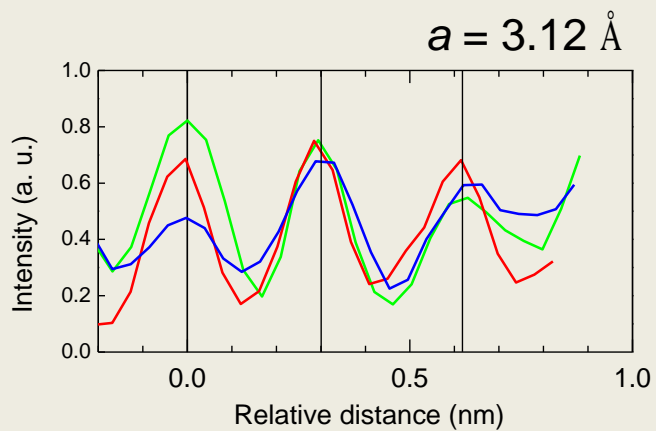
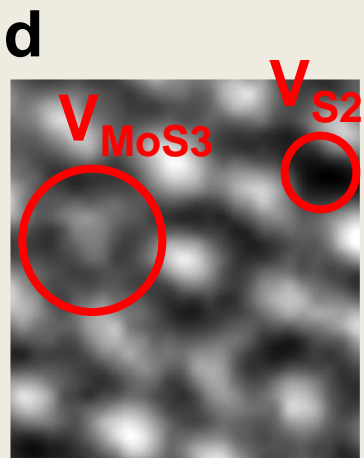
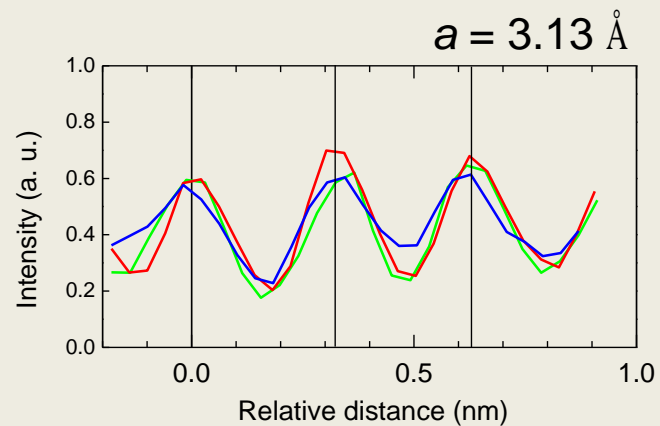
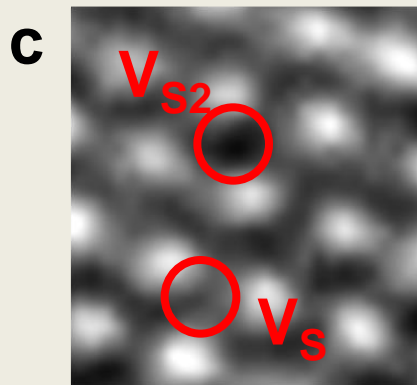
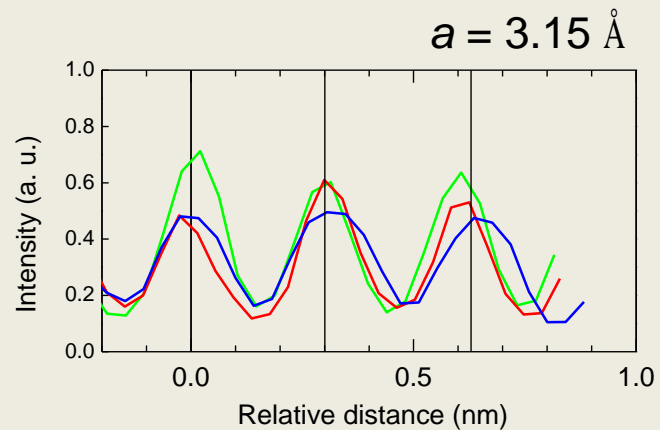
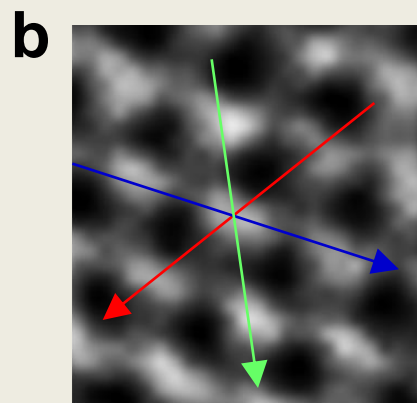
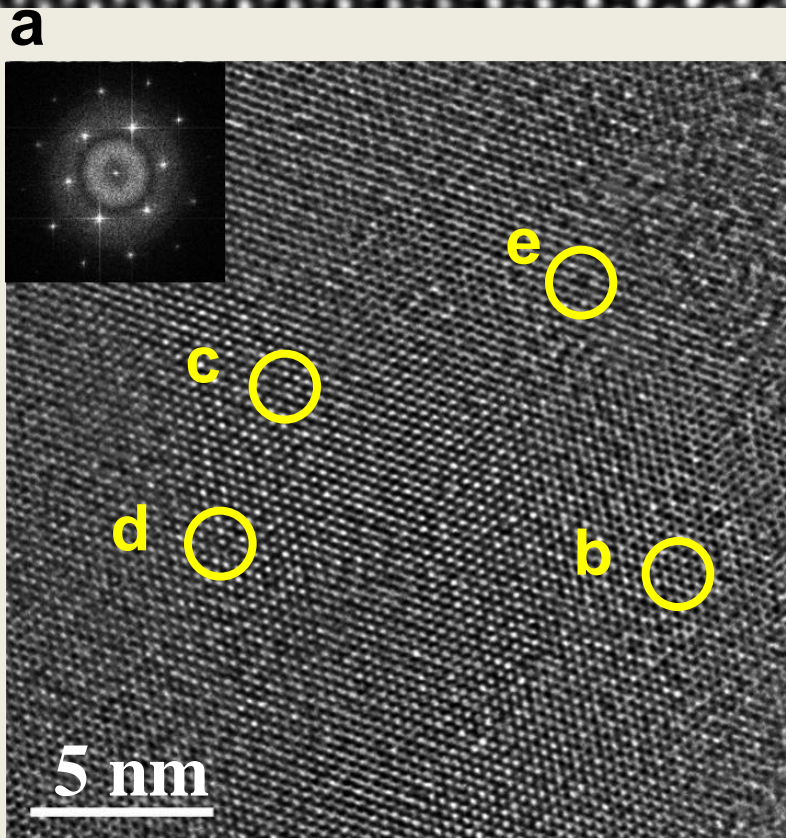
Diamagnetism

**a****b****c****d**



# Electrical properties







# Ferromagnetic 1T phase

