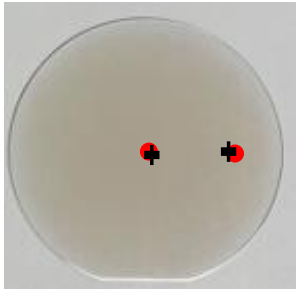
Material: WSe_2

Substrate: 2” c-plane Sapphire

2D Crystal Consortium
NSF Materials Innovation Platform

PennState Materials Research Institute

MCL Materials Characterization Lab



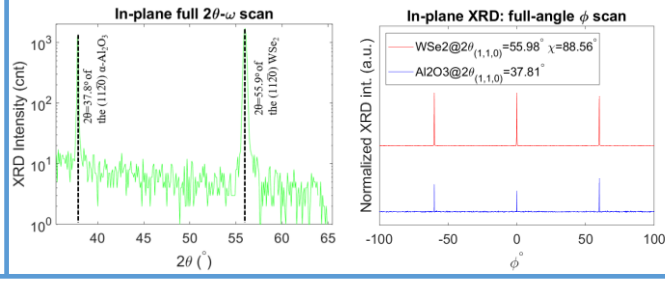
Sample details: The WSe_2 was grown via MOCVD on double-side polished 2” c-plane sapphire. The letter “R” was inscribed on back of substrate near the major flat.

Shipping: The sample is face down in the container and sealed in nitrogen filled glove box. The mark “R” was inscribed on backside of substrate near the major flat.

✚ Approximate positions where AFM micrographs were taken

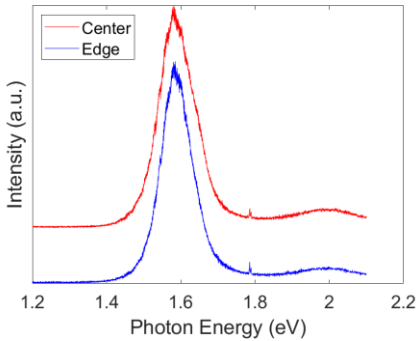
● Approximate position where Raman/PL spectra were measured

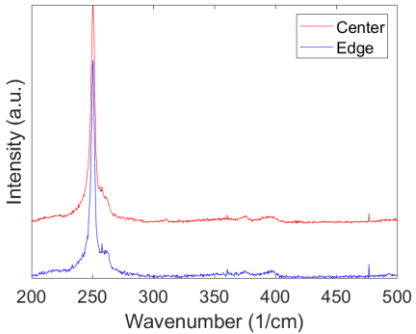
In-plane XRD



In-plane XRD shows WSe_2 monolayer is epitaxially orientated to c-plane Sapphire with $(11\bar{2}0)$ of WSe_2 // $(11\bar{2}0)$ of α-Al_2O_3

Raman and PL:



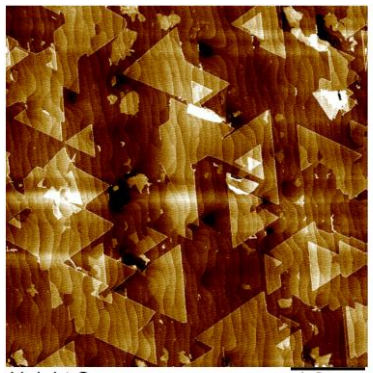


PL demonstrates luminescent peak at ~1.6 eV suggesting a monolayer sample. Raman spectra is consistent with a monolayer WSe_2 film with some bilayers with peak at ~250 cm^{-1} (A_{1g} and E_{2g}) and ~310/360/375/400 cm^{-1} ($A_{interlayer}$).

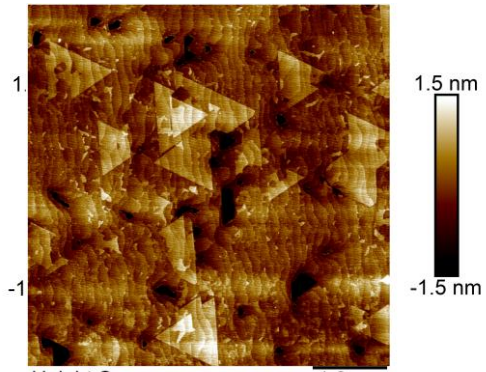
PL conditions:
Laser wavelength: 532 nm
Laser– 4 mW Acquisition time- 20 s (2 times)
Objective – 100X Grating – 300 gr/mm

Raman conditions:
Laser wavelength: 532 nm
Laser– 4 mW Acquisition time- 30 s (3 times)
Objective – 100X Grating – 1800 gr/mm

AFM:



Center



Edge

AFM shows the film is a monolayer WSe_2 sample with some bilayers/multilayers (in triangular shape).

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