2D Detector Datasheet

1. MoS_2 Sample

Preparation Process of MoS2 Sample

1. Prepare a wafer cleaned sequentially with acetone, IPA, and DI water for 10 minutes each.
2. Attach the MoS2 exfoliated mechanically 4–5 times on tape to the wafer, then place it in a vacuum chamber for at least one hour. Remove the tape afterward.
3. Keep the sample in the vacuum chamber for over an hour, then remove the tape. *Type of tape used:* Blue tape with lower adhesive strength than Scotch tape.

Results: Scan 1

Substrate Size: 23x50mm²

Scan Conditions: (RGB values represent contrast. The RGB values were adjusted to maximize the test score of the directly identified 2D MoS2.)

*Scan 1–4 were conducted on the same substrate with only changes to the scan conditions.

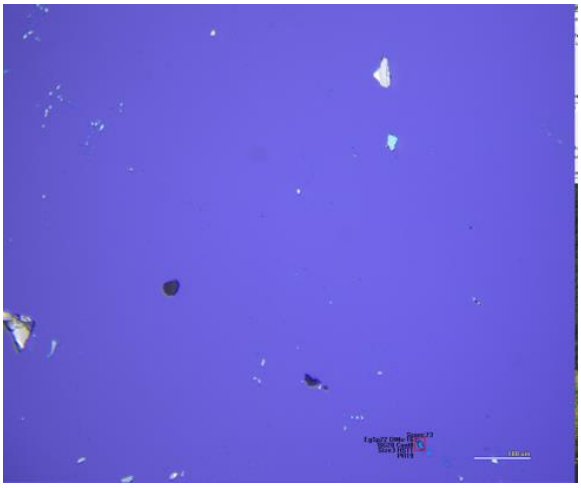
R	G	B	TOLERANCE	TEST SCORE**	Minimum SIZE***
-55%	30%	2%	35%	N/A	100um

** Score Recognized by the Machine

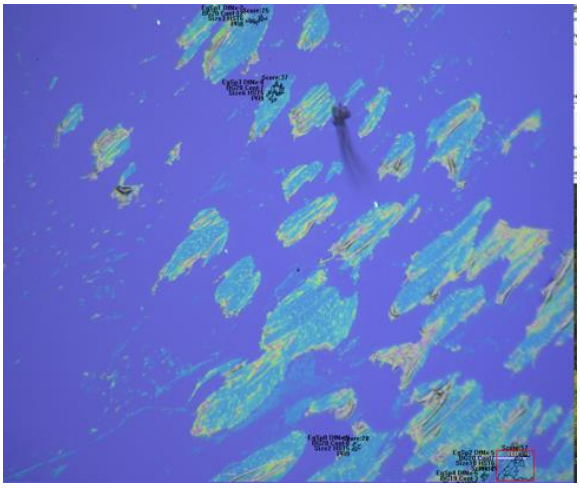
***Setting value

Number Detected	Correctly Detected	Incorrectly Detected
11	10	1

Correctly Detected



Incorrectly Detected



Results: Scan 2

Substrate Size: 23x50mm²

Scan Conditions: (RGB values represent contrast, and the RGB values were adjusted to maximize the test score for the directly identified 2D MoS_2.)

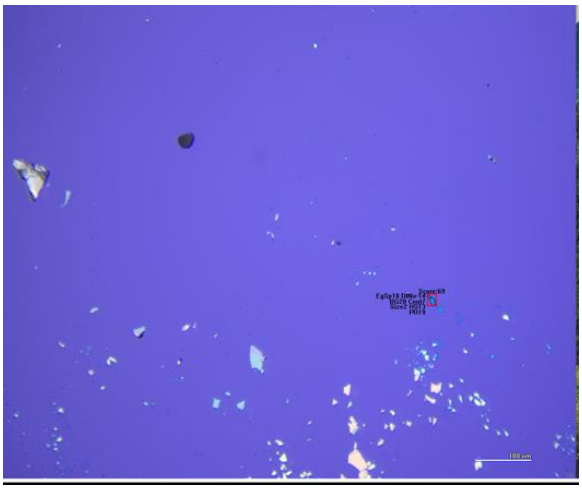
R	G	B	TOLERANCE	TEST SCORE**	Minimum SIZE***
-62%	43%	2%	35%	50	100um

** Score Recognized by the Machine

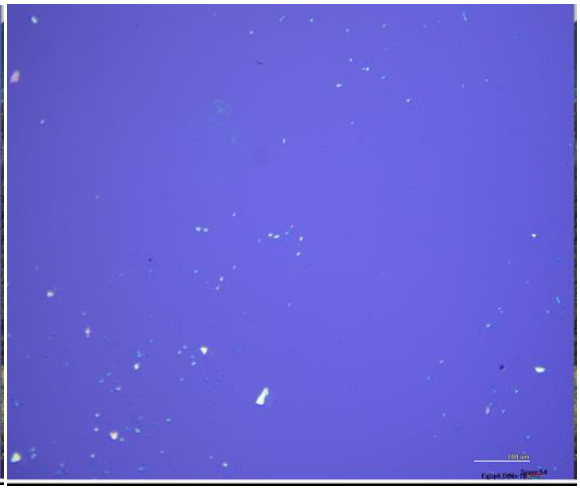
***Setting value

Number Detected	Correctly Detected	Incorrectly Detected
6	5	1

Correctly Detected



Incorrectly Detected



Results: Scan 3

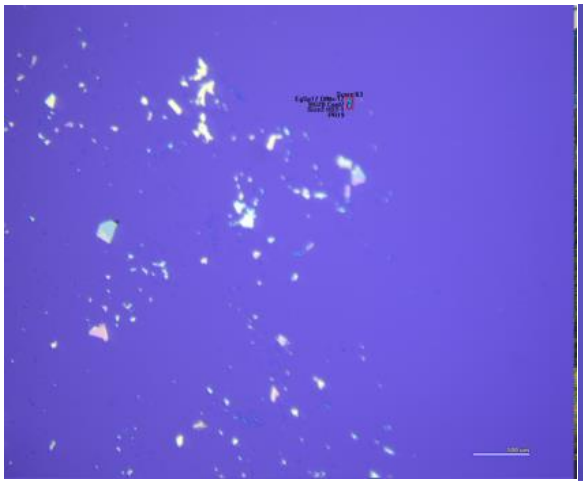
Substrate Size: 23x50mm^2

R	G	B	TOLERANCE	TEST SCORE**	Minimum SIZE***
-68%	50%	2%	35%	N/A	100um

** Score Recognized by the Machine
***Setting value

Number Detected	Correctly Detected	Incorrectly Detected
5	4	1

Correctly Detected



Incorrectly Detected

Results: Scan 4

Substrate Size: 15x38mm^2

Scan Conditions:

R	G	B	TOLERANCE	TEST SCORE*	Minimum SIZE**
-62%	0%	2%	40%	N/A	100um

** Score Recognized by the Machine
***Setting value

Number Detected	Correctly Detected	Incorrectly Detected
6	5	1

Correctly Detected

Incorrectly Detected

Scan 5

Substrate Size: 23x50mm^2

Scan Conditions:

R	G	B	TOLERANCE	TEST SCORE**	Minimum SIZE***
-50%	10%	2%	35%	70	10um

** Score Recognized by the Machine

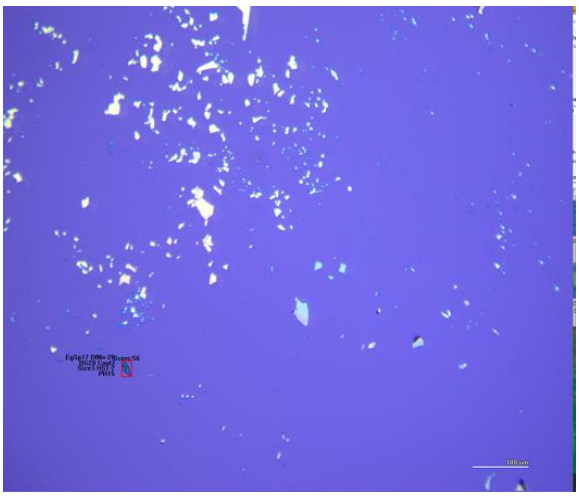
***Setting value

Results:

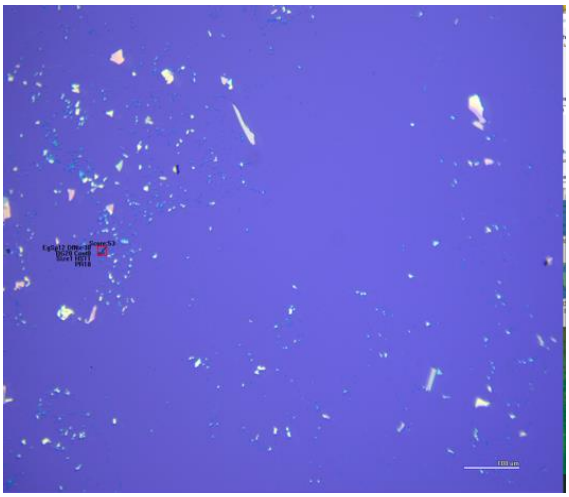
Number Detected by the Machine	Correctly Detected	Incorrectly Detected
40	8	32

Due to the inability to achieve perfect tilt correction, many incorrect detections occurred as a result of focus misalignment. (It is anticipated that more precise tilt correction would improve performance.)

Correctly Detected



Incorrectly Detected



Summary of Scan 1–5 Results

- Changing the scan conditions in scans 1–4 led to the detection of different flakes from the sample.
- In some cases, the scanned results failed to identify the test flakes required for setting contrast values.
- In scan 4, the sample was tilted, and since tilt correction was not applied, many incorrect detections occurred due to focus misalignment (the upgraded product includes a tilt correction feature).
- Adjusting the tolerance to 30–40% increases the target score, enabling more accurate flake detection.

2. hBN sample

- Preparation Process for hBN Sample

1. Prepare ITO glass (ensure the front side is the one with resistance).
2. Prepare PVA (mix 100g DI water + 13g PVA, stir the mixture at 80°C and 200rpm for 24 hours).
3. Coat the ITO glass with PVA four times (coating conditions: 700rpm for 10s, 2000rpm for 40s -> bake at 110°C for 60s -> cool).
4. After applying PVA four times, coat the ITO glass with PMMA twice (coating conditions: 700rpm for 10s, 2000rpm for 40s -> bake at 110°C for 60s -> cool).
5. Once PVA has been applied four times and PMMA twice, attach Scotch tape to the edges.
6. Mechanically exfoliate HBN onto the Scotch tape, attach it to the prepared substrate, bake at 110°C for 5 minutes, and then remove the tape.

Scan

Substrate Size: 50x50mm^2

Scan condition:

R	G	B	TOLERANCE	TEST SCORE*	Minimum SIZE**
2%	8%	7%	6.4%	N/A	500um

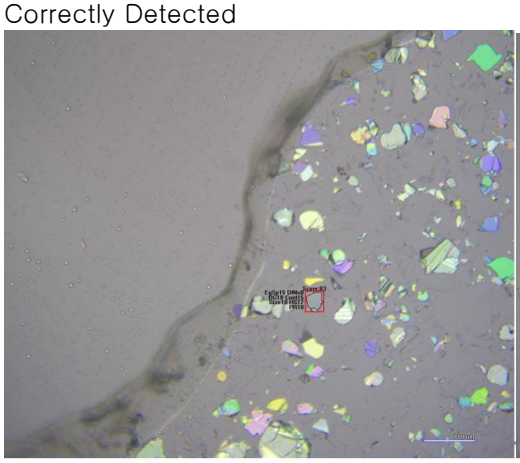
** Score Recognized by the Machine

***Setting value

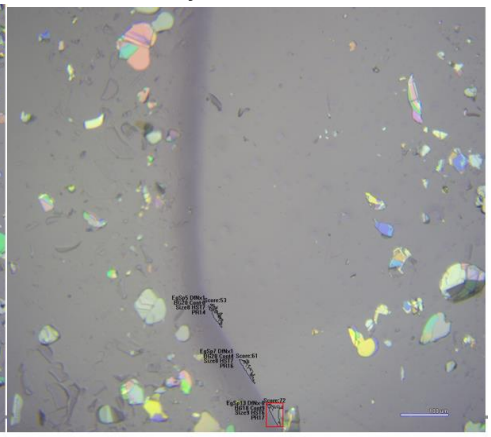
Results:

Number Detected by the Machine	Correctly Detected	Incorrectly Detected
49	17	32

Correctly Detected



Incorrectly Detected



The 32 incorrect detections were due to similar noise patterns, as shown in the image.

Results of Scan

- Setting the minimum size to 500 μm² yields meaningful flake sizes.
- Adjusting the tolerance to between 5% and 10% improves the target score, enabling more accurate flake detection.
- hBN is very difficult to detect visually; therefore, preparing larger samples and utilizing this equipment for automated detection is effective.