

Example report. This shows our standard report format using demonstration data from an SEM calibration standard. It is not a client job.

ANALYTICAL REPORT

SEM line-pitch measurement of a 100 nm calibration standard

Report number	NL-EXAMPLE-SEM
Imaging date	May 3, 2025
Client	Example (internal demonstration)
Samples	1 calibration standard
Analyses performed	SEM imaging; line pitch measurement from images

1. Summary

QUESTION

Measure the line pitch of a calibration standard with a nominal 100 nm pitch, center to center as the standard's reference specifies.

RESULTS AT A GLANCE

Nano Lab ID	Sample	Analysis	Result
NL-01	100 nm calibration standard	SEM	Mean pitch 99.1 ± 2.2 nm (mean $\pm$ SD, n = 50). Range 93.7 to 103.2 nm.

2. Samples

Nano Lab ID	Description	Condition	Preparation
NL-01	SEM calibration standard, 100 nm line set	Intact	None. Imaged as received.

3. Methods and results

3.1 SEM

CONDITIONS

Instrument	Field-emission scanning electron microscope
Accelerating voltage	20 kV
Beam current	0.10 nA
Working distance	9.5 mm
Detector	Secondary electron
Magnification / pixel size	10,000× (overview); 300,000× for measurement, 0.45 nm per pixel
Coating	None

MEASUREMENT METHOD

The 300,000× image (1536 × 1020 pixels used) was divided into ten horizontal bands of 102 pixel rows each. In each band, the intensity profile across the lines was averaged over the band, and each line's center was taken as the midpoint of its full width at half maximum. Pitch is the distance between adjacent line centers. Six lines lie fully within the image, giving five pitches per band and 50 measurements in total. The lines are within 0.3° of vertical, so no tilt correction was applied.

RESULTS

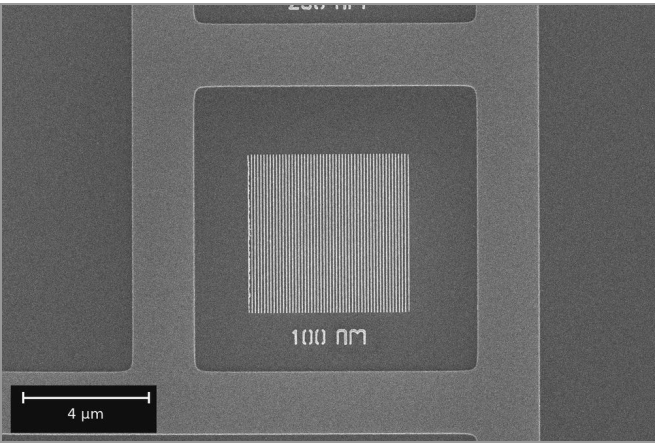


Figure 1. NL-01, overview of the 100 nm line set, 10,000×.

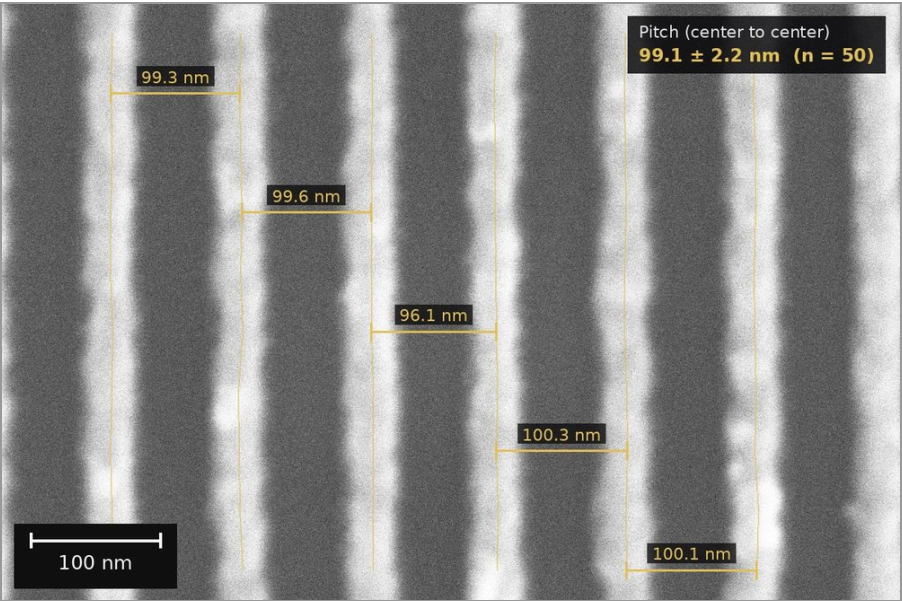


Figure 2. NL-01, 300,000×. Thin lines mark the measured line centers; five example pitch measurements are labeled.

Line pair	Mean pitch (nm)	SD (nm)	n
1-2	99.5	1.1	10
2-3	101.2	1.4	10
3-4	95.5	0.7	10
4-5	99.7	0.9	10
5-6	99.8	1.0	10
All	99.1	2.2	50

Table 1. Center-to-center pitch for each adjacent line pair, measured at ten positions along the lines.

- Figure 2 and Table 1 show a mean pitch of 99.1 ± 2.2 nm across 50 measurements, against a nominal 100 nm.
- Pair 3-4 measured 95.5 ± 0.7 nm, lower than the other four pairs (99.5 to 101.2 nm).

4. Notes and limitations

- Measured distances depend on the instrument's magnification calibration. The pixel size was taken from the instrument.
- Line edge roughness contributes to the spread between positions along each line.
- Results represent the single area imaged and may not represent the whole standard.

5. Data delivered

- Full-resolution images (.tif), 2 files
- Measurement table (.xlsx)

Release

Example report: signatures omitted. Results relate only to the samples as received and tested. This report is confidential to the client named above and may be reproduced only in full. Nano Lab, LLC is not an ISO/IEC 17025 accredited laboratory.