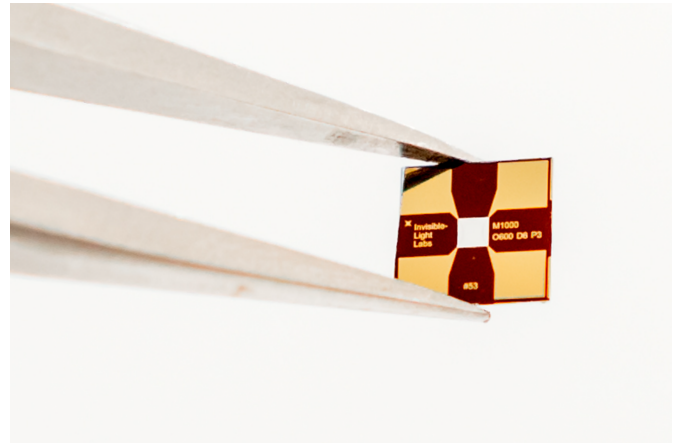


EMILIE™ · CONSUMABLE

EMILIE™

Nanoelectromechanical Sampling & Sensing Chip

The single-use silicon-nitride nanomechanical chip at the heart of EMILIE™. It both collects the sample and detects it, enabling high-sensitivity NEMS-FT-IR analysis with no transfer step in between.



MEMBRANE

50 nm SiN

CHIP SIZE

5 × 5 mm
380–525 µm thick

SENSING AREA

1000 × 1000 µm

FORMAT

Single-use

FEATURES

- ✗ Sample holder and detector in one: the analyte is collected directly on the sensing membrane, eliminating transfer and minimizing cross-contamination.
- ✗ 50 nm perforated silicon-nitride membrane with gold/chromium electrodes.
- ✗ The perforated sampling area enables aerosol collection by impaction as well as drop- and spin-casting.
- ✗ Chemically inert, heat-resistant silicon nitride; the intrinsic SiN band at 835 cm⁻¹ serves as an internal reference for normalization.
- ✗ Single-use. Prevents cross-contamination in trace analysis.

SHARED CHIP PLATFORM

The sampling, validation and light chips share one platform: a 50 nm low-stress silicon-nitride perforated membrane, Ø 600 µm perforated area with 6 µm holes on a 3 µm pitch, gold/chromium electrodes, a unique chip number per batch, and a 5 × 5 mm chip size (380–525 µm thick). The sampling and sensing chip is single-use and should be handled with carbon-fibre-tip high-precision tweezers in clean environments.

TABLE 1 MEMBRANE & STRUCTURE

Membrane material / thickness	Low-stress silicon nitride, 50 nm
Perforated area	Ø 600 µm
Perforation diameter / pitch	6 µm / 3 µm
Electrodes	Gold / Chromium
Chip size (L × W × thickness)	5 × 5 mm × 380–525 µm
Packaging	PVC/POM-C box, Gel-Box™ or capsule

TABLE 2 INTERNAL REFERENCE

Internal reference peak (SiN)	835 cm ⁻¹ (broad 700 – 1000 cm ⁻¹)
SiN reference absorbptance	0.21 ± 0.01 at 835 cm ⁻¹

TABLE 3 MASS LOADING

Dynamic mass-load range	LoD – 200 ng
Optimal mass load	30 ng
Maximum dried mass (avoid overload)	≤ 200 ng

TABLE 4 OPERATION & HANDLING

Chip temperature range in EMILIE™	5 – 80 °C
Handling	Carbon-fiber-tip high-precision tweezers; hold the frame or electrodes, never the membrane

TABLE 5 AEROSOL SAMPLING

Particle size (impaction)	10 – 3200 nm
Impaction collection efficiency	up to 60 %
Max aerosol flow through chip	1.0 L/min

TABLE 6 DROP CASTING SAMPLING

EMILIE™ DROP CASTING ACCESSORY

Capacity	Up to 20 chips simultaneously
Recommended droplet	500 – 1000 nL
Dry time — 500 nL DI water	≈ 30 min
Dry time — 1 µL DI water	≈ 60 min
Sample type	Aqueous samples

COMMERCIAL NANODISPENSING SYSTEM

Droplet volume	2 – 20 nL
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TABLE 7 APPLICATION LIMITS OF DETECTION

Proteins ¹	170 – 210 pg
Nanoplastics ²	100 – 350 pg
Aerosol organic functional groups ³	1.3 – 5.4 ng

REFERENCES

¹ NEMS-FTIR Protein Analysis with EMILIE™, Invisible-Light Labs GmbH, 2025.

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