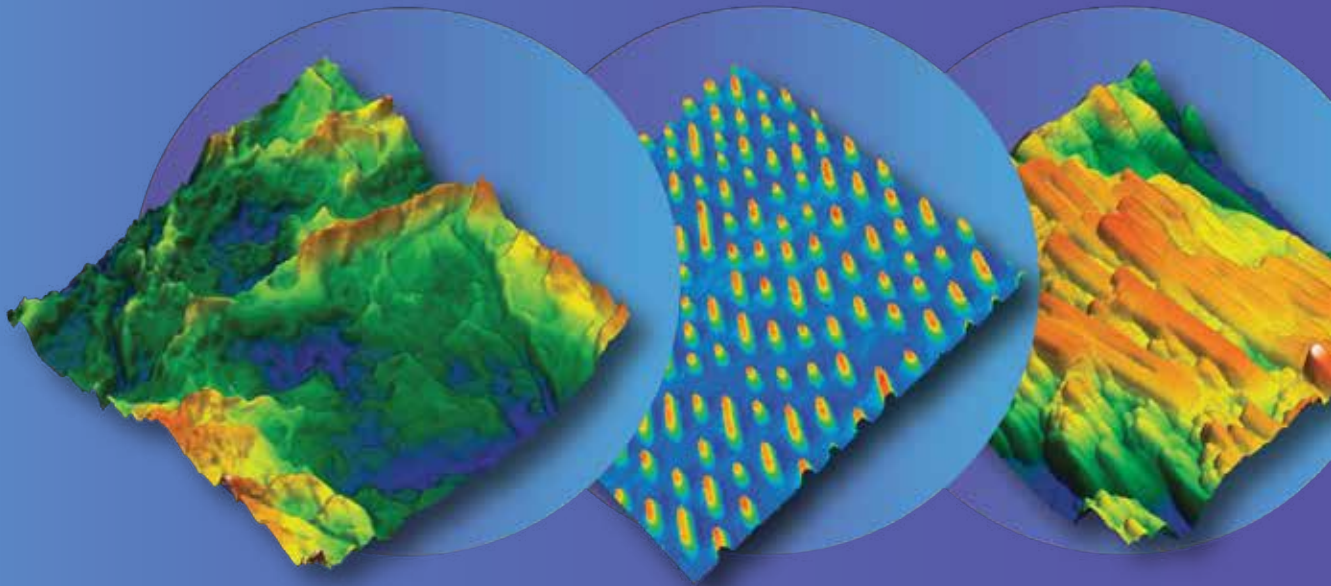


# 3D images with nanoscale resolution

Capture 3D images with 1,000,000x  
magnification on your benchtop with  
the nGauge AFM



## Our Mission

ICSPI is on a mission to bring robust, easy-to-use, nanoscale metrology everywhere.

“I can attest that this technology is extremely reliable and can produce images that rival much larger and more expensive AFM systems.”

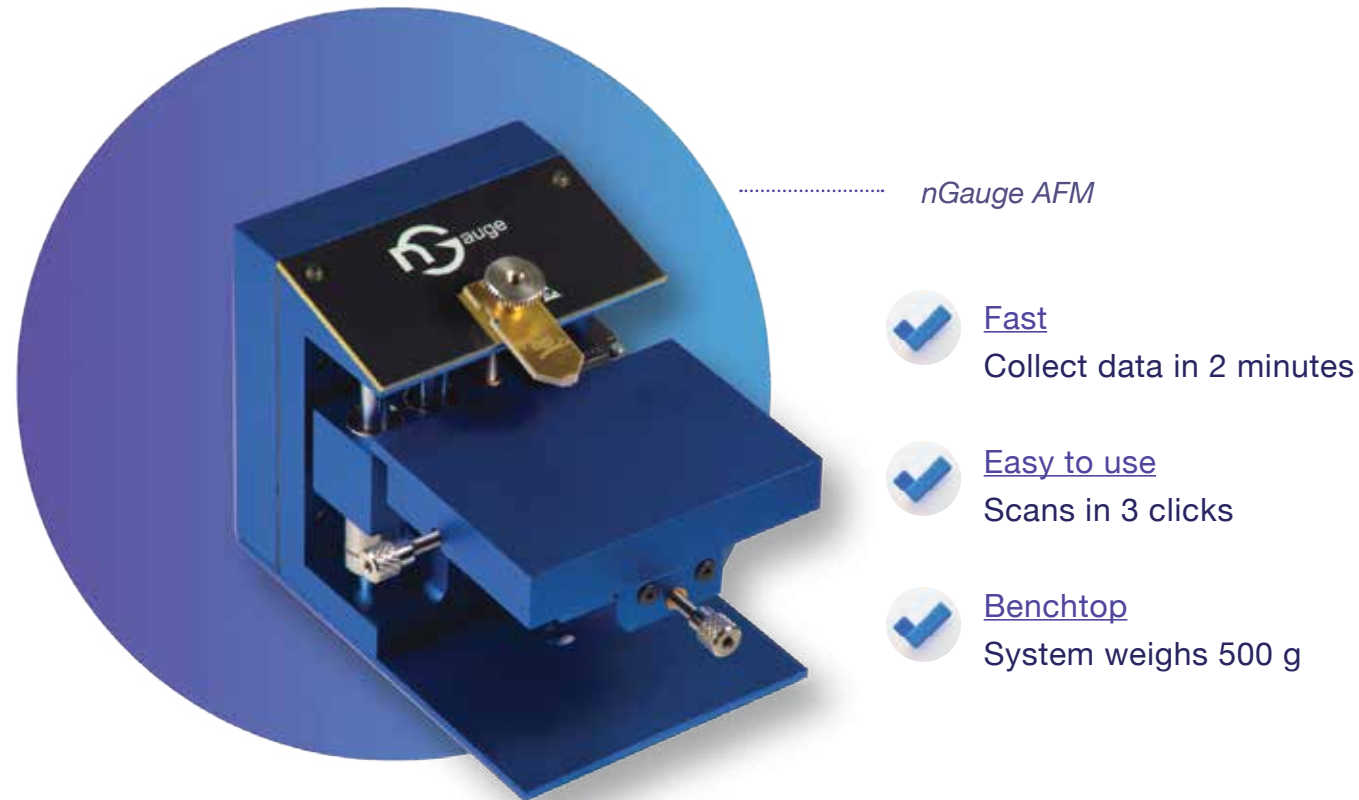
Professor Michael Cullinan  
University of Texas at Austin, USA



## What we do

ICSPI designs, manufactures and sells single-chip scanning probe microscopes for educational, research and industrial applications, including failure analysis and quality control.

We push the limits of what is possible in nanoscale metrology with our team of engineers of the highest calibre working on our patented CMOS-MEMS technology. ICSPI is headquartered in Kitchener-Waterloo, Ontario, Canada.



## Our Story

ICSPI was founded in 2007 with the goal of bringing robust, easy-to-use, nanoscale metrology to everyone. Although technology continues to shrink faster than ever, nanoscale imaging has remained relatively inaccessible. Frustrated by the poor versatility, complexity and high costs of traditional nanoscale imaging systems, ICSPI sought to revolutionize nanoscale imaging and bring the technology to every laboratory, student and researcher.

After nearly 10 years of research and development at the University of Waterloo, Canada, with funding from DARPA and the Ontario Research Fund, ICSPI commercialized the world's first single-chip atomic force microscope (AFM). Launched in 2017, our flagship product—the nGauge AFM—has reset the expectations for AFM and nanoscale metrology: all of the scanners and sensors have been integrated onto a single 1 mm x 1 mm CMOS chip, dramatically simplifying the operation of nanoscale metrology instruments.

The nGauge AFM is trusted by researchers, scientists and engineers at universities, government institutes, and by companies of all sizes, from startups to the largest companies in the world. The nGauge is also used by educators for teaching the next generation of students from high school to graduate school in over twenty countries.

# Patented AFM-on-a-chip Technology

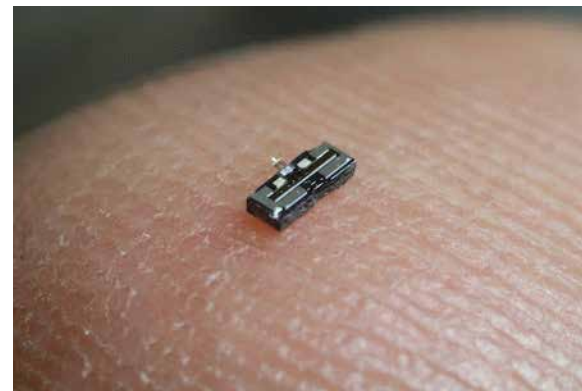
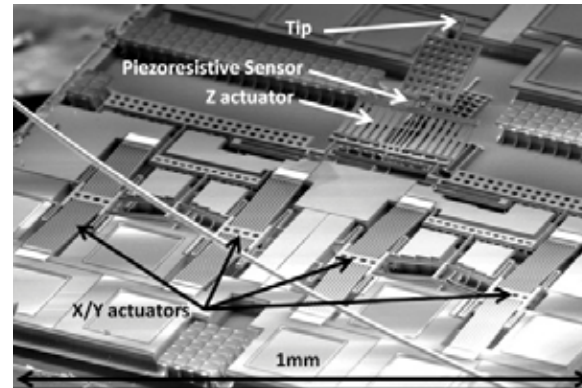
## AFM-on-a-Chip

The nGauge AFM is a laserless system: the integrated piezoresistive sensor allows for alignment-free operation and a fully automatic approach – so you can collect your data effortlessly.

All of the sensors and scanners of traditional AFM instruments have been integrated onto a single 1 mm x 1 mm chip.

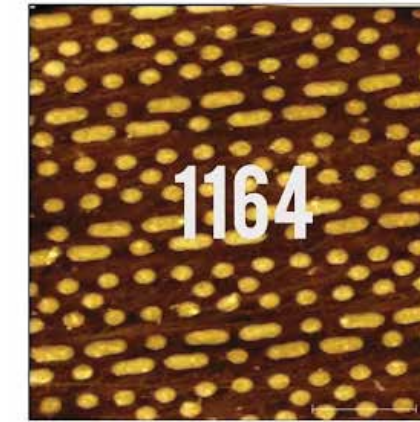
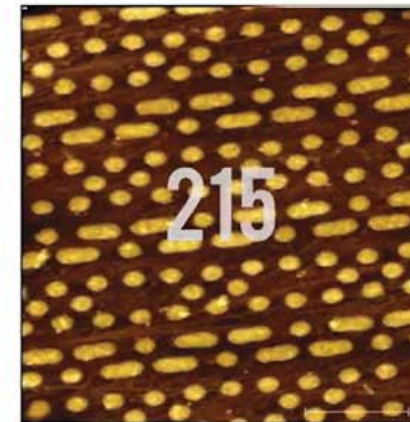
“We have been blown away by its performance, ease of use and portability. The tool easily saves us several thousand dollars a month in AFM usage fees at third-party labs.”

**Dr. Michael Helander, CEO**  
OTI Lumionics, Canada



## Long Lifetime

nGauge AFM tips are made of hard, durable materials like diamond-like carbon and aluminum oxide, which maximize lifetime, making hundreds or thousands of scans possible with each chip.



# nGauge Specifications

## Scanning

---

|                                |  |
|--------------------------------|--|
| <b>Scan types</b>              | Topography, Phase                            |
| <b>Scan size</b>               | 20 $\mu\text{m}$ $\times$ 20 $\mu\text{m}$   |
| <b>Scan size (25 stitched)</b> | 100 $\mu\text{m}$ $\times$ 100 $\mu\text{m}$ |
| <b>XY Scanner Resolution</b>   | <0.5 nm                                      |
| <b>Vertical Scan Range</b>     | 10 $\mu\text{m}$                             |
| <b>Noise floor</b>             | <0.5 nm                                      |

## Resolution and Speed

---

|                             |                    |
|-----------------------------|--------------------|
| <b>Quick scan</b>           | 16 sec             |
| <b>Routine scan</b>         | 80 sec             |
| <b>High-resolution scan</b> | 5 min              |
| <b>Max resolution</b>       | 1024 x 1024 pixels |

## Samples

---

|                          |                        |
|--------------------------|------------------------|
| <b>Max sample size</b>   | 100 mm x 50 mm x 20 mm |
| <b>Max sample weight</b> | 1 kg                   |



## Comparison

|                           | nGauge AFM | Traditional AFM | SEM       |
|---------------------------|------------|-----------------|-----------|
| Operations in air         | ✓          | ✓               | X         |
| Automatic approach        | ✓          | X               | N/A       |
| Install time              | 5 min      | 1–2 weeks       | 1–2 weeks |
| Time to data              | 2 min      | 1 hr            | 30min–1hr |
| Cost                      | \$         | \$\$\$          | \$\$\$\$  |
| Cost per scan             | \$         | \$\$            | \$\$      |
| Benchtop operation        | ✓          | X               | X         |
| Training time             | 1 hr       | 12+hrs          | 12+hrs    |
| Laser/beam alignment-free | ✓          | X               | X         |
| Regular power and USB     | ✓          | X               | X         |
| Easy to handle probes     | ✓          | X               | N/A       |
| Maintenance-free          | ✓          | X               | X         |
| 3D images                 | ✓          | ✓               | X         |
| Sub-nanometer resolution  | ✓          | ✓               | X         |
| Non-conductive samples    | ✓          | ✓               | X         |

Trusted by hundreds of researchers world-wide



SEAGATE



Bundesanstalt für  
Materialforschung  
und -prüfung





## 3d nanoscale scans in 3 clicks

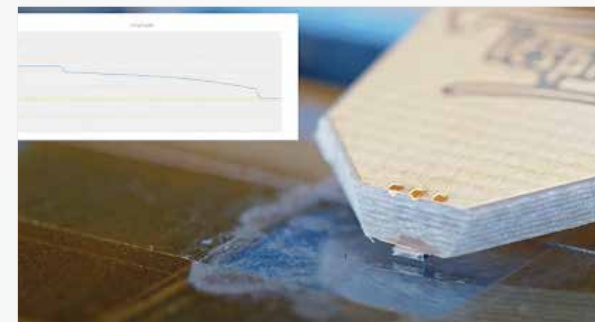
### 1. Automatic Sweep

One-click automatic frequency sweep completes in five seconds



### 2. Automatic Approach

One-click automatic tip-sample approach completes in ten seconds



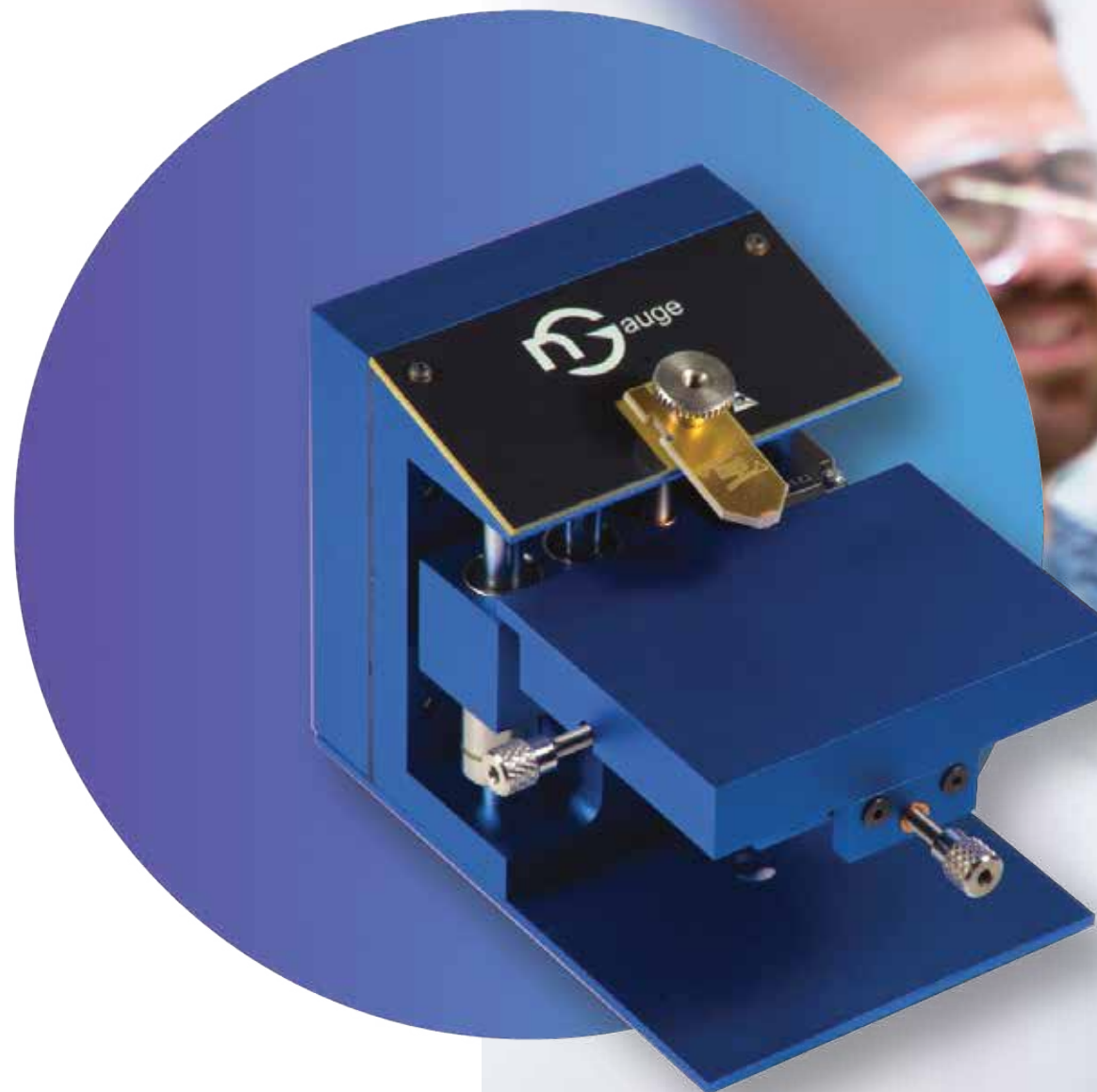
### 3. Fast Scanning

Capture routine scans in just over a minute



nGauge AFM

Reveal insights at the  
nanoscale on your  
benchtop.



icspi



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March 2022