

OPTICS11 LIFE PIUMA V3

Technology

The Optics11 Life Piuma Nanoindenter is purposely built to explore soft materials down to cell-length scales, providing true insights in the mechanics of native and engineered materials. These unique capabilities are enabled by the Optics11 Life patented micro-machined fiber-optic sensors.

This indentation instrument uses this sensor to gently push a spherical glass tip on the surface of the sample. By closely monitoring the resulting sample deformation, the Piuma Nanoindenter can rapidly provide all mechanical details of the indented spot.

In addition, all Optics11 Life probes are pre-calibrated making them plug-and-play design which streamlines experiments. This ensures fast measurements which is critical for time-sensitive biology-related experiments. Last, being small and portable yet powerful, the Piuma nanoindenter will fit any lab.



Characterize mechanical properties of:

- Biological tissues
- Engineered tissues
- Spheroids
- Cell scaffolds
- Hydrogels
- 3D printed biomaterials
- Particles/capsules

Key features:

- Install on any bench or tabletop surface
- Easy to learn and master
- Pre-calibrated probes
- Reliably measure even the softest samples
- Direct data & result output
- Customizable displacement/load/indentation profiles
- Micro-DMA (dynamic mechanical analysis) capability
- Automatic find-surface function
- Small footprint
- Little to no maintenance require



Technical specifications

Imaging capabilities

Upright camera (standard)
Inverted camera (optional)

5 Megapixel
10-140x magnification
Long working distance
LED control

Indentation capabilities

Probe force range
Stiffness range

20 pN – 2 mN
5 Pa – 1 GPa

Indentation stroke
Tip size and geometry
Contact size diameter
Coarse X-Y stage travel
Coarse Z stage travel
Minimum lateral pitch

Up to 100 μm @0.5 nm resolution
3 μm – 250 μm , spherical
1 μm – 100 μm
Closed-loop, 12 x 12 mm @80nm resolution
Closed-loop, 12 mm
0.2 μm

Compatible formats

All common dishes
Well plates (up to 96 wells)

Minimum sample volume

>0.4 μL for 96-well plate (thickness 3 μm)

Indentation speed

~0 – 5×10^4 $\mu\text{m/s}$

Modes of interrogation

Quasi-static indentation (E , G)
Step-response (Creep / Stress-Relaxation)
Dynamic/oscillatory (DMA: E' , E'' , G' , G'')
Adhesion mode

Frequency range

0.1 – 20 Hz

Control modes

Load/depth/piezo-displacement

Test environments

Air or liquid (water, culture medium)

Environmental control

Temperature (optional)

Heated stage (3 x 3 cm) up to 60 $^{\circ}\text{C}$

