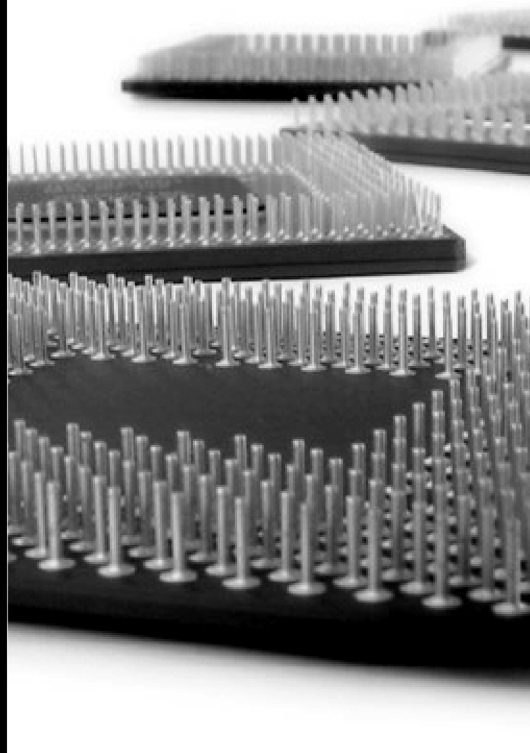
PROBE
WORKSTATION



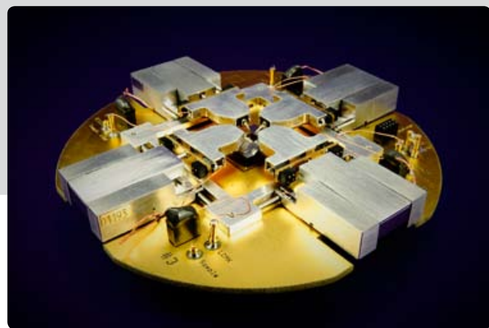
Semiconductor characterization system

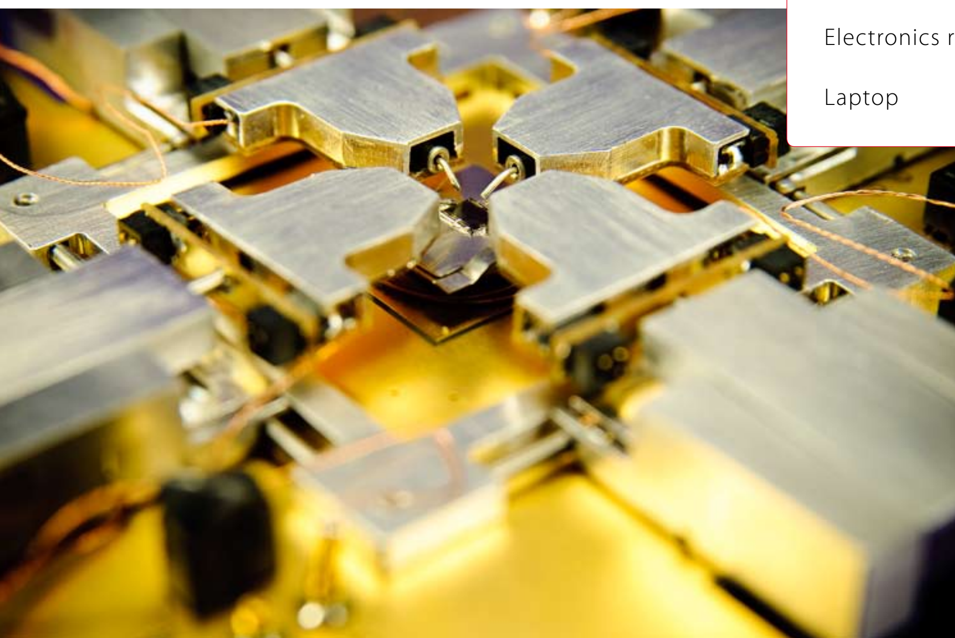
PROBE WORKSTATION

The ProbeWorkstation is a powerful, dedicated system for electrical characterization of semiconductor devices and advanced materials in SEM and FIB.

The optimal combination of our market-leading nanomanipulation and probing products and a Keithley 4200 parameter analyzer provide you with a versatile, integrated solution for failure analysis and R&D applications requiring stable, low-current measurements.

The system is optimized for electrical measurements on semiconductor technologies down to 45 nm. It offers unsurpassed stability, extreme precision and the flexibility to allow you to configure your setup to meet your specific needs.



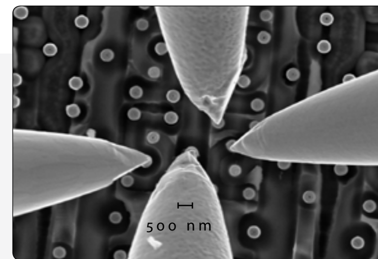


APPLICATIONS

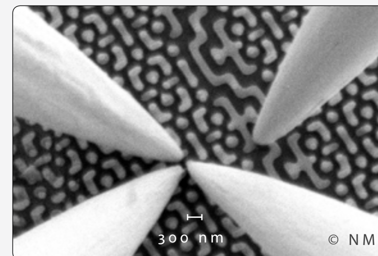
- Failure analysis
- Qualifying high κ gate materials
- Low-current transistor testing
- Four-point probing
- EBIC & RCI analysis
- Characterization of advanced materials and structures e.g. nanowires, ultra-thin films
- Nanoscale assembly and manipulation

COMPONENTS

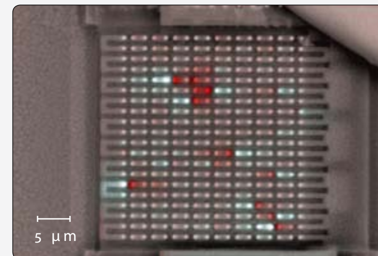
- Four micromanipulators with low-current measurement capability
- Shuttle load-lock platform
- Keithley 4200-SCS
- Safe tip approach module
- EBIC/RCI amplifier
- iProbe software
- 30 nm probe needles
- Electronics rack
- Laptop



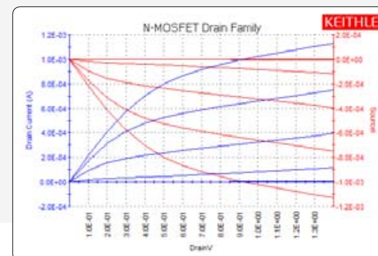
Four-point probing



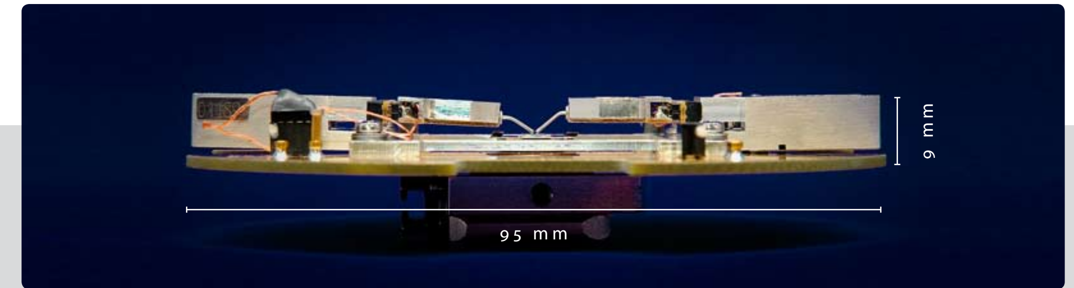
Three-point probing on 90 nm semiconductor structures



Monitoring of capacitive coupled resistance changes in via chains - RCI image overlaid on the SEM image



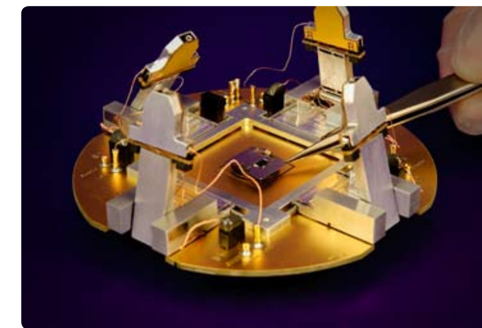
I-V curves from a transistor built on 90 nm technology



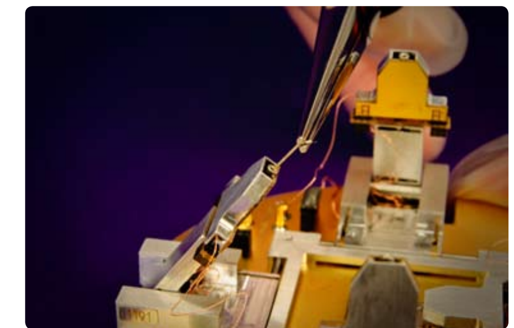
Actual size Side view of two manipulators mounted on the Shuttle platform

Next generation technology has allowed us to dramatically reduce the size of our micromanipulators. This innovation, coupled with our new Shuttle platform, has enabled the creation of the world's smallest load-lock compatible probing system.

A load-lockable system offers the advantages of higher throughput, fast probe tip exchange, reduced sample contamination and unrestricted access to the microscope when the probe system is not required.



Sample exchange



Probe tip exchange

The iProbe software allows intuitive and effortless control of multiple probers

Contact us at info@nanotechnik.com

or find your local agent at www.nanotechnik.com

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Next generation micromanipulators

A = LEFT/RIGHT
B = UP/DOWN
C = IN/OUT

- The ultra-flat three-axis manipulator with unmatched stability and precision
- Operating range A 10 mm, B 80°, C 5 mm
- Piezo range A 1 µm, B 10 µm, C 1 µm
- Resolution A 0.25 nm, B 2.5 nm, C 0.25 nm
- Low drift 1 nm/min
- Reliable operation (one year endurance test)
- Fast pre-positioning by hand
- No backlash, creep or reversal play
- Fine and coarse displacement in one drive

Low-capacity, low-current measurements

- Current measurement limit 0.2 fA
- Insulation leakage current 50 fA at 1 V
- Signal conductor resistance 2 Ω
- Maximum voltage 100 V
- Maximum current 100 mA

EBIC/RCI amplfier

- Open detection in integrated circuits
- Visualization of *p-n* junctions
- Localization of resistivity changes in via chains
- Current measurement limit 10 fA
- Gain 10^5 to 10^{12} V/A

iProbe software

- Dynamic 3D control for four probers
- Intuitive, user-friendly and easy to learn
- Precision through six orders of magnitude
- Runs on microscope PC or laptop

Shuttle platform

- SEM and FIB load-lock compatibility
- Quick and easy probe tip and sample exchange
- Total system height 9 mm
- Total system width 95 mm
- Maximum sample size 12 mm × 12 mm × 1 mm
- Pioneering cabling technology
- Weight 100 g

Probe needles

- Tungsten needles with 30 nm tip radius
- Packaged in protective atmosphere

Keithley 4200-SCS

- Resolution 0.1 fA
- Accuracy 20 fA
- Maximum voltage 210 V
- Maximum current 100 mA
- Other Keithley models are also available for less demanding applications

Safe tip approach

- Current sensor that provides a simple, fast and secure method for landing probe tips on sensitive conductive surfaces
- Contact check for source, drain & substrate

All technical specifications are approximate. Due to continuous development, we reserve the right to change specifications without notice. Version 9.07. © Kleindiek Nanotechnik GmbH.

ELECTRONICS RACK