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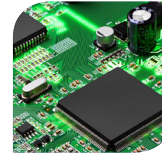
EAG Laboratories



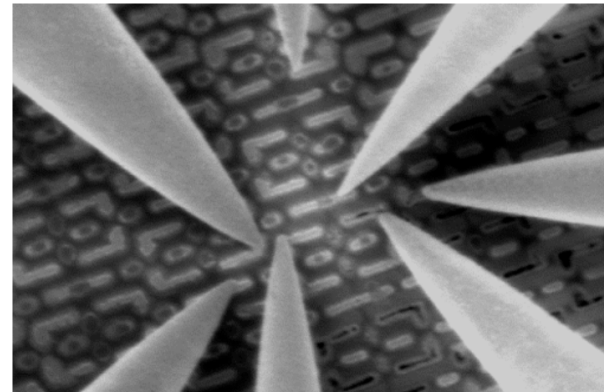
# EAG's Nanoprobing Capabilities: Enhanced Analysis and Failure Detection

Nanoprobing is a highly specialized analytical technique used in semiconductor physics and electronics industries. This technique utilizes nanometer-scale precision movement probes to make direct contact with individual semiconductor devices such as transistors. Being able to measure the electrical properties at this level facilitates accurate and non-destructive analysis of nanoscale features which are too small to perform using traditional, manual methods. It is vital to the scientific research and development of advanced electronic devices and materials, enabling the process of failure analysis, design validation, quality control, and manufacturing to help innovate smaller and more novel technologies. Nanoprobing is a key method for analyzing and testing electronic materials, and it can be applied to a broad range of samples such as:

- Integrated Circuits
- Transistors, Memory Bit Cells, Test Structures
- eFuses
- Nanotubes
- LEDs, Diodes, MEMS
- Solid State Batteries

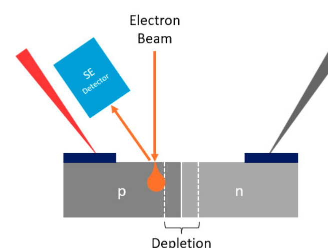
## Nanoprobing at EAG

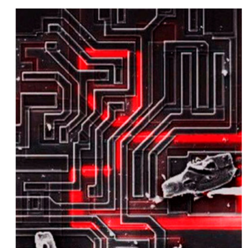
Eurofins EAG operates advanced SEM-based nanoprobing equipment from Kleindiek, Inc. with built-in parameter analyzer and signal/current amplifier to enable a wide range of characterization and analytical techniques such as EBIC/EBAC and EBIRCH. Our cutting-edge system delivers precise measurements and failure analysis for advanced nodes, providing our clients with detailed, highly accurate data to stay ahead in semiconductor development, ensuring product reliability and performance. With the ability to analyze sub-10 nanometer structures, using 8 probes on samples up to 20 x 20 millimeters and a voltage range of +/- 100 V for DC measurements (+/- 50 V for current imaging), the system also features a heating and cooling insert for device characterization across a wide temperature range from -20ºC to +150ºC.



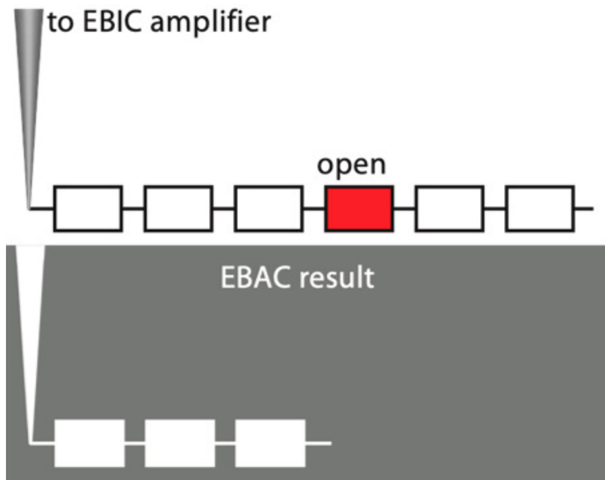
## Analyses and Applications

- Transistor characterization / Family of Curves, low-current measurements
- Two-point and Four-Point Kelvin measurements
- EBIC (Electron Beam Induced Current) – high voltage +/-50V amplifier
- EBAC (Electron Beam Absorbed Current)
- RCI (Resistive Contrast Imaging)
- EBIRCH (Electron Beam Induced Resistance Change)

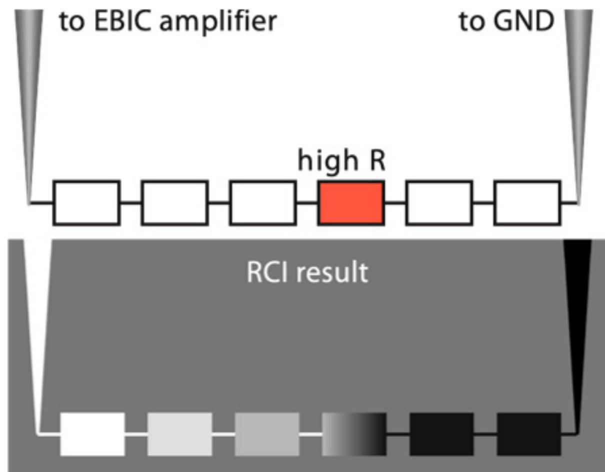


*EBIC Analysis*



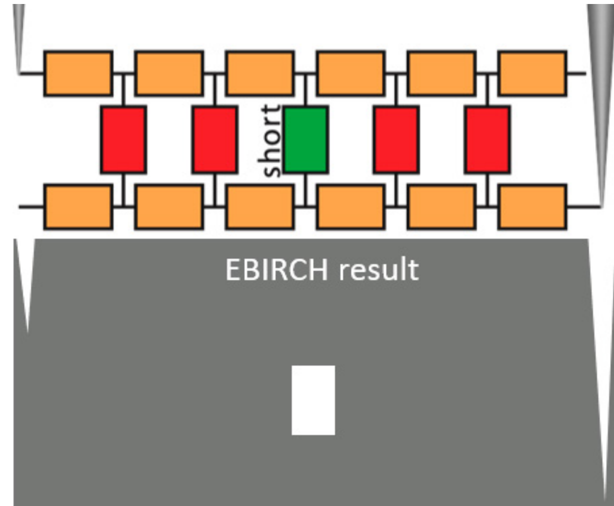
*EBAC Analysis*



*RCI Analysis*

## Failures and Examples

- Advanced Materials and Structures Characterization (e.g. nanowires, solid state batteries)
- Fault Localization (e.g. leakages, shorts, or opens)
- Memory bit cells, test structures, via chain, logic net, MIM capacitors, etc.
- PN Junction Characterization



*EBIRCH Analysis*

Nanoprobing plays a critical role in understanding and evaluating the performance of semiconductor materials and conducting failure analysis, particularly for the ever-shrinking, advanced technologies. Its significance extends to the advancement and quality assurance of many innovations, which continues to become more electronics centric.

## Contact EAG

EAG offers failure analysis services in support of our clients' need to achieve high quality and reliable products. Our commitment to this goal is demonstrated by providing a single source for comprehensive engineering services. EAG is the leader in providing an extensive breadth of services and providing unmatched accessibility through our laboratory locations around the world. To learn more about nanoprobing as well as our other services, contact EAG today.

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