

ScanWave PRO™ SOLUTIONS

Automated Quantified Dopant Measurements

KEY FEATURES

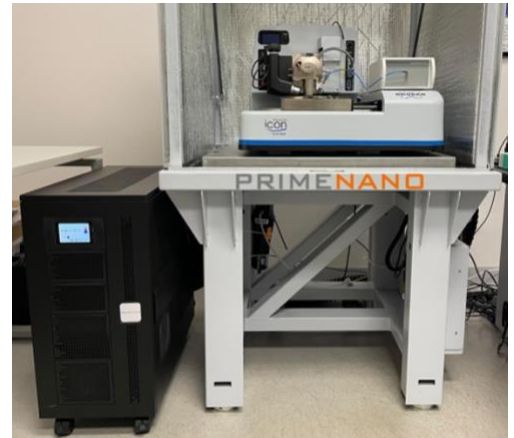
- Automated Quantification of Dopants
 - Accurate, calibrated dopant images
- Nanoscale Dopant Spatial Resolution
 - 10 nm lateral resolution
- Widest Detection Range of Dopant Levels
 - Intrinsic silicon to $1E20 \text{ a/cm}^3$
- Identifies Dopant Polarity
 - N or P Type Identified
- Stable and Repeatable
 - Repeatability better than 0.1 of a decade of dopant level

BENEFITS

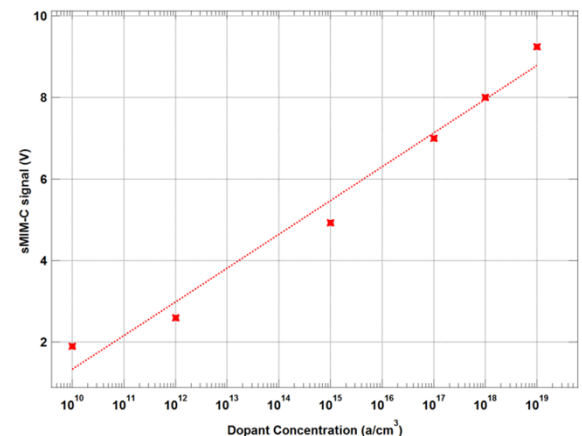
- Fast & Automated Quantification
- Highest sensitivity to dopants in the industry
- Better insight into your measurements
 - Quantified results solve problems
- Little to no sample preparation required
- Electrical measurements on insulators
- Tool-less probe exchange
- Bruker Dimension Icon AFM supported

PRODUCT DESCRIPTION

- Software
 - AFM Measurement Automation
 - Calibration Process Automation
 - Image Processing and Presentation
- Hardware
 - Enclosure temperature control unit to 0.1°C/hr
 - Reference sample and holder
 - 100 – 240 V AC
 - 500 W Max
 - Requires ScanWave Pro™



ScanWave Pro™ Solutions Hardware



ScanWave Response to Dopant Concentration from Intrinsic Silicon to $1E19 \text{ a/cm}^3$

Application Examples

Quantified Image of Doped Epitaxial Silicon

The unprecedented lateral resolution combined with the industry's highest sensitivity provide detailed dopant maps and depth profiles. Show in Figure 1 is the dopant concentration map and depth profile of two face-to-face assembled epitaxially grown and doped silicon samples. The false color map represents dopant levels with nanoscale positional precision. The dopant type (n

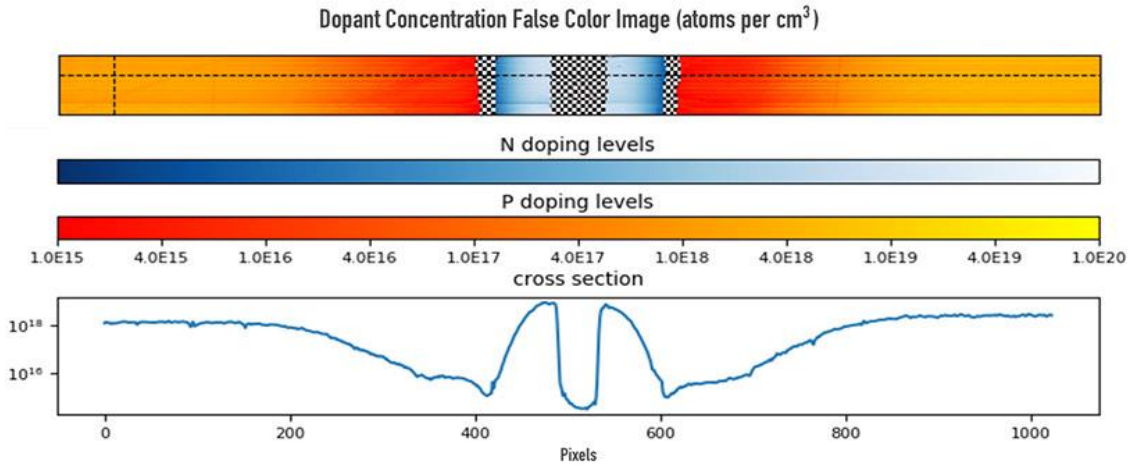


Figure 1 Dopant Concentration Map and Depth Profile

or p) is determined, and color coded in the map above. Operations on the false color map such as line cross sections (also shown above), point readout and more are standard in this system. This map is automatically generated by the ScanWave Pro™ Solutions system.

Industry's Highest Sensitivity to Dopant Levels

ScanWave Pro™ Solutions achieves sensitivity to low dopant levels never before possible without very expensive, complicated and destructive techniques such as SIMS. The log-linear response of ScanWave to dopant concentration (Figure 2) facilitates accurate and repeatable quantification of results for any level of dopant used in chip production today.

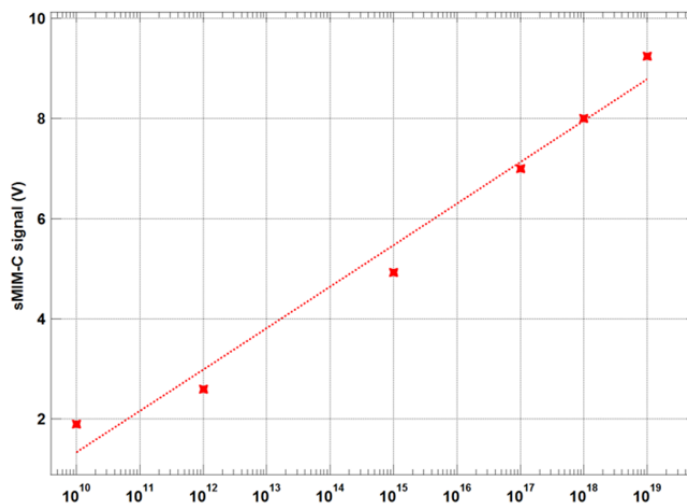


Figure 2 ScanWave Response to Dopant Concentration from intrinsic Silicon to $1\text{E}19 \text{ a/cm}^3$

High Repeatability Measurements

Dynamic repeatability was measured using a reference standard and found to be better than 1/10 of a decade of concentration (Figure 3) for each of the dopant levels in the sample ($1E15$ to $1E20$ a/cm^3). The ScanWave Pro™ Solutions temperature control unit achieves stable temperature in the enclosure of 0.1 °C/hr guaranteeing ultimate repeatability. Failure analysis and process monitoring using ScanWave Pro™ Solutions is now fast, repeatable, and easy to perform.

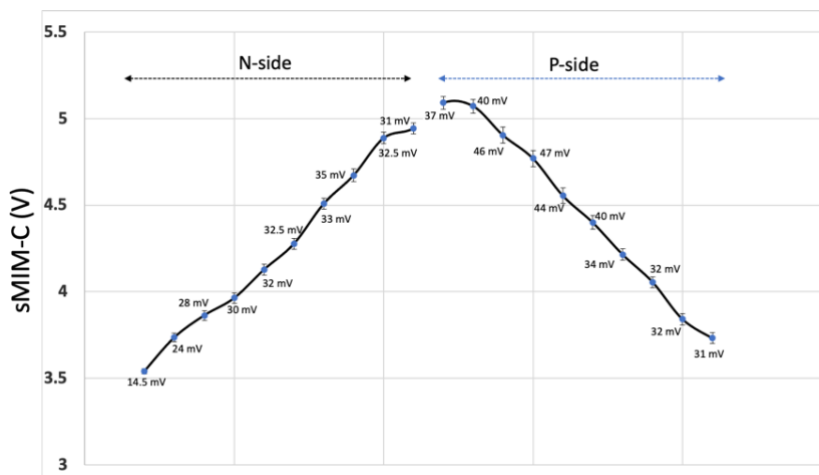


Figure 3 Capacitance Signal (Volts) Repeatability for Staircase Sample