Semiconductor & Nanomaterial Testing Services

Applied Research & Photonics, Inc. (ARP) provides terahertz nano-scanning material characterization and testing services that helps semiconductor and nanomaterial researchers and manufacturers, easily visualize and identify in 3-Dimensional images, surface, sub-layer defects and failures. ARP testing is non-contact, non-destructive and performed at ambient temperatures.

New Innovative Imaging Technology

ARP’s Terahertz Scanning Spectrometer (TeraSpectra) is a Terahertz Nano-Scanning Spectrometer/3D Imaging system that has two key technology innovations:

1) it breaks the spatial resolution limit of current generation optical inspection technologies, and
2) it uniquely identifies location and depth where defects exist.

Currently, there is no measurement technology that has the capability to provide an equivalent richness of information that ARP’s TeraSpectra system can deliver without damage or destruction of the test sample.

Current Inspection Technology have Limitations

Atomic Force Microscopes (AFM) are one of the go-to technologies for wafer inspection, but require surface contact which can damage nanometer scale circuits. X-Ray inspection technology imparts high energies which can damage substrate lattice structure. IR inspection technologies at wavelengths of 1.5 microns and UV inspection at 256 nanometers, which are the current state of the art, but are limited to surface inspection only. Electron Microscopes are very expensive, require sample destruction and tedious sample preparation.

Materials

- Semiconductor Wafers
- Nanomaterials
- Soft materials
- Nano-composites

Key Features

- 3-Dimensional Imaging
- Sub-Surface Inspection
- Non-Contact
- Non-Destructive
- Layer-by-Layer Analysis
- Material Characterization:
  - Lattice Image
  - Stacking Fault
  - Dislocations
  - Nanovoids
  - Delamination

Fast Turnaround Testing

Once material samples are received test duration is typically between 1 and 3 days per sample. Test duration, as always, are subject to the test criteria and characterization requirements of our customers. ARP consultants provide a comprehensive test report and assist in interpretation of results.

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**Revolutionary 3D Nano-Scale Sub-Surface Testing Services**

**Key Feature & Benefits**

- Non-Contact & Non-Destructive Testing
- Sub-Surface Layer by Layer Inspection
- Sub-Nanometer Resolution
- 3-D Imaging
- Fast Turnaround Testing

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*Carbon nanotube film on Si wafer: 60° aligned*

(a) Three-dimensional image of 1 cubic micron volume of a "GaN on Si" wafer, (b) Two slices of one square micron surfaces image of the same (0X plane). Distorted lattice patterns are visible indicating damages of the GaN layer.

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Measuring the world one nano-particle at a time.