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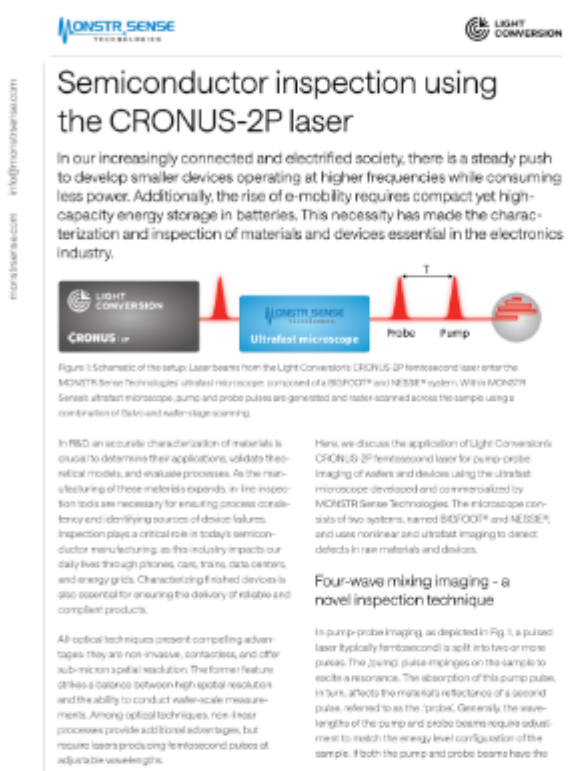
MONSTR SENSE TECHNOLOGIES

LIGHT CONVERSION

Semiconductor inspection using the CRONUS-2P laser

In our increasingly connected and electrified society, there is a steady push to develop smaller devices operating at higher frequencies while consuming less power. Additionally, the rise of e-mobility requires compact yet high-capacity energy storage in batteries. This necessity has made the characterization and inspection of materials and devices essential in the electronics industry.

Figure 1. Schematic of the setup. Laser beams from the Light Conversion's CRONUS-2P femtosecond laser enter the MONSTR Sense Technologies' ultrafast microscope, composed of a BIGFOOT® and NESSIE® system. Within MONSTR Sense's ultrafast microscope, pump and probe pulses are generated and raster-scanned across the sample using a combination of galvo and wafer-stage scanning.

In R&D, an accurate characterization of materials is crucial to determine their applications, validate theoretical models, and evaluate processes. As the manufacturing of these materials expands, in-line inspection tools are necessary for ensuring process consistency and identifying sources of device failures. Inspection plays a critical role in today's semiconductor manufacturing, as this industry impacts our daily lives through phones, cars, trains, data centers, and energy grids. Characterizing finished devices is also essential for ensuring the delivery of reliable and compliant products.

All optical techniques present compelling advantages: they are non-invasive, contactless, and offer sub-micron spatial resolution. The former feature strikes a balance between high spatial resolution and the ability to conduct wafer-scale measurements. Among optical techniques, non-linear processes provide additional advantages, but require lasers producing femtosecond pulses at adjustable wavelengths.

Here, we discuss the application of Light Conversion's CRONUS-2P femtosecond laser for pump-probe imaging of wafers and devices using the ultrafast microscope developed and commercialized by MONSTR Sense Technologies. The microscope consists of two systems, named BIGFOOT® and NESSIE®, and uses nonlinear and ultrafast imaging to detect defects in raw materials and devices.

Four-wave mixing imaging - a novel inspection technique

In pump-probe imaging, as depicted in Fig. 1, a pulsed laser (typically femtosecond) is split into two or more pulses. The 'pump' pulse impinges on the sample to excite a resonance. The absorption of this pump pulse, in turn, affects the material's reflectance of a second pulse, referred to as the 'probe'. Generally, the wavelengths of the pump and probe beams require adjustment to match the energy level configuration of the sample. If both the pump and probe beams have the

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Semiconductor Inspection Using the CRONUS-2P Laser

Inspection plays a critical role in today's semiconductor manufacturing. Nonlinear optical techniques present compelling advantages, but require lasers producing femtosecond pulses at adjustable wavelengths. Here, we discuss the application of Light Conversion's CRONUS-2P femtosecond laser for pump-probe imaging of wafers using the ultrafast microscope developed by MONSTR Sense Technologies, utilizing nonlinear imaging to detect defects in raw materials and devices.

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