

Press release

Fraunhofer IPM at SEMICON Europa

Optical inline quality control for electronics manufacturing

How do you inspect submicrometer-scale, 3D structures during chip production? How do you detect the tiniest contaminants on electronic contacts? How do you control laser drilling processes for microvias? Fraunhofer IPM has the answers, showcasing three optical systems for quality control in electronics manufacturing at SEMICON Europe 2026. A highlight on display will be the world's first HoloTop Motion, which enables the rapid 3D measurement of microelectronic structures.

As electronic structures become smaller, quality control becomes more demanding. At the same time, high production speeds require measurement methods that are precise, fast, and capable of inline operation. At SEMICON Europa, Fraunhofer IPM will present optical solutions for three essential tasks: high-resolution 3D measurement of wafer and microbump structures, inspection of electronic contact surface cleanliness, control of laser drilling for microvias. The systems perform non-contact measurements and are designed to be integrated into industrial production and processing equipment. Fraunhofer IPM will present these technologies from November 10 to 13, 2026, in Hall C1, Booth 908, at the trade show in Munich.

World first: HoloTop Motion—3D measurement without stopping

With HoloTop Motion, Fraunhofer IPM is introducing a new generation of digital holographic sensors for high-precision 3D measurement of moving surfaces. Unlike conventional methods, components do not need to be stopped or removed from the production line for measurement. The sensor scans the surface section by section and combines the measurement data into a continuous topographic map.

The system is ideal for inspecting wafers, interposers, and ball grid arrays. Depending on the objective lens used, HoloTop Motion achieves a lateral resolution better than two micrometers. Axial repeatability is less than one micrometer. Measurements can be taken at feed velocities of up to one meter per second.

F-Camera detects contaminants on electronic contacts

Clean surfaces are essential for reliable electrical welds, solder joints, plug-in connections, crimped joints, and subsequent joining, coating, or bonding processes. Even small amounts of residue from oils, greases, cleaning agents, paints, or fluxes can compromise the quality and function of electronic components. The F-Camera uses imaging technology to inspect surfaces without contact at the rate of the production cycle. UV light causes organic substances to fluoresce. This makes even minute residues visible and quantitatively measurable. The system records the position, shape, and extent of contaminants and defects, among other things.

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RAPID-LIBS for controlling laser drilling of microvias

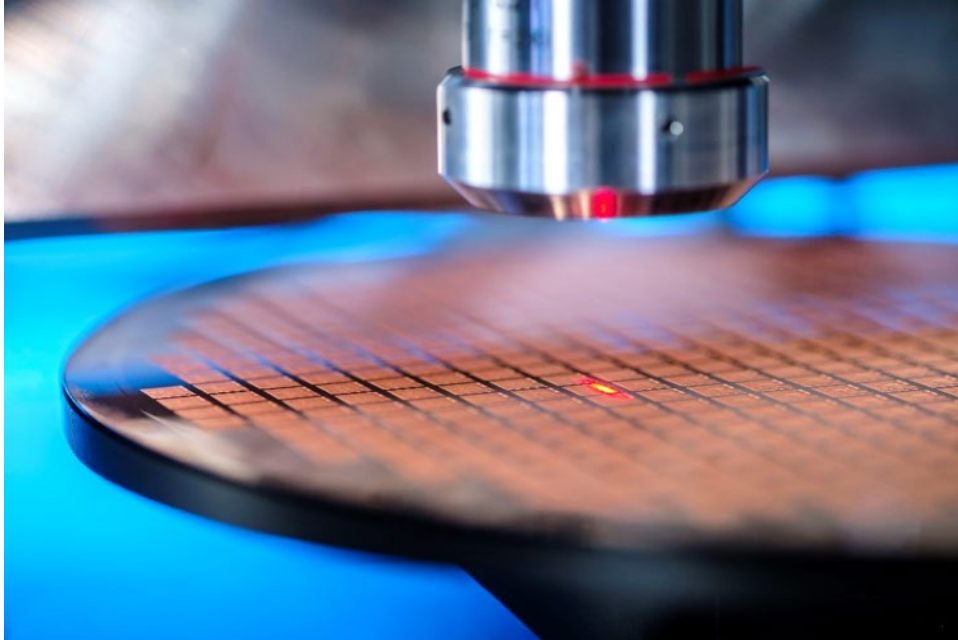
Microvias connect the conductive layers of multilayer printed circuit boards. During laser drilling, the insulating material must be removed precisely without damaging the underlying copper layer. However, varying layer thicknesses make it difficult to reliably control the laser process with a fixed number of pulses. RAPID-LIBS analyzes the plasma generated during laser ablation. The system captures the material-specific spectrum and detects, in real time, the material composition at the processing point. Material transitions can be resolved pulse by pulse and immediately fed back to the laser controller as a control signal. This enables each hole to be drilled and controlled individually and in real time.

Further information

- **HoloTop Motion:** <https://www.ipm.fraunhofer.de/en/bu/production-control-inline-measurement-techniques/systems/holo-top-motion.html>
- **F-Camera:** <https://www.ipm.fraunhofer.de/en/bu/production-control-inline-measurement-techniques/systems/f-camera.html>
- **RAPID-LIBS:** <https://www.ipm.fraunhofer.de/en/bu/production-control-inline-measurement-techniques/systems/rapid-libs.html>

Fraunhofer IPM at SEMICON Europa 2026

November 10–13, 2026, Messe München, Hall C1, Booth 908



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The HoloTop Motion 3D sensor captures the topography of moving microstructures right on the production line. © Fraunhofer IPM

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