

SEM ICAPS

Excellence In Innovation



About SEMICAPS.....

SEMICAPS began its operations in 1989 when professors at the National University of Singapore, together with their graduate students, commercialized a product developed at the Centre for Integrated Circuit Failure Analysis and Reliability (CICFAR). The company specializes in electron, ion and photon beam technologies and associated techniques for the failure analysis (FA) of semiconductor materials and devices. Our technical staff has strong backgrounds in these technologies, computer hardware and software; complemented with an in-depth appreciation of the application requirements of the industry.

Over the last 25 years, SEMICAPS has achieved numerous industry firsts, most of which are highlighted on this page. To recognize its technology leadership, the Singapore government in 2009 awarded the SEMICAPS team the President's Science and Technology Award. This is Singapore's highest honor bestowed on exceptional research scientists and engineers for their excellent achievements.

Today, the superiority of our laser-based fault localization microscopes is undoubted. Many features and techniques in this field are exclusive to SEMICAPS.

Worldwide Firsts

SEMICAPS 5000 Wafer Prober	
2009	A patented direct tester docked analytical wafer probe system using a commercial probe card, thus avoiding the need for cables in order to achieve test speeds of up to 300 MHz.
2011	An improvement made on the wafer support platform allows the landing of a probe card with more than 5000 probe pins; first system delivered to GLOBALFOUNDRIES.
2013	Further support improvements enabled the use of an Advantest V93000 Direct-Probe System (thus avoiding the need for an interface board) to achieve test speeds of up to 8 GHz at wafer probe.
SEMICAPS LTP Laser Timing / Waveform Probe	
2008	A contactless waveform probing system using a continuous wave (CW) laser for better performance.
2009	First to achieve 8 GHz bandwidth.
2011	First to provide a 12 GHz LTP detector.
2012	Compatible with test loop lengths of over 1000 ms for tester based analysis.
SEMICAPS SIL Solid Immersion Lens	
2007	First SIL for InGaAs photon emission microscope (PEM).
2007	A SIL that can work with both the InGaAs camera and the laser scanning microscope (LSM).
2007	An aplanatic solid immersion lens for backside laser analysis.
2010	A centric solid immersion lens that is compatible with full thickness (800 microns) dies.
2010	First to resolve a linewidth of below 120 nm.
2013	Achieves linewidth resolution of below 100 nm.
2013	First ARSIL for a photon emission microscope (PEM).

SEMICAPS SOM Scanning Optical Microscope	
2001	A pulsing laser to enhance the sensitivity of laser induced techniques was co-developed with AMD. This patented technique uses a lock-in amplifier to synchronize the pulse timing.
2003	A pixel-by-pixel high-resolution (2048 x 2048) laser scanner was introduced. This allowed user selectable random pixel access. This enhances the scanning efficiency by avoiding the scanning of unnecessary pixels.
2010	A patented software lock-in was implemented to improve performance.
2013	Multiple AOI Exploiting the random pixel-by-pixel scanning feature, software was developed to allow users to define multiple areas-of-interest for optimum efficiency during laser scanning analysis.
SEMICAPS AURICOOL Thermal Management	
2011	A patented conduction based heat extraction system to successfully cool a 200W device with attached die-side components while it is undergoing dynamic analysis using a SIL.
2013	The use of a graphene sheet to obtain lateral re-distribution of heat for higher cooling efficiency.
SEMICAPS PEM Photon Emission Microscope	
2004	An InGaAs camera was used for backside emission analysis in a PEM.
SEMICAPS Techniques and Methods	
1999	SDL Co-developed with AMD, this system synchronized the SDL/LADA machine with the test cycle while using a laser to locate soft defects.
2013	ODLA A patented automated method for on-die logic analysis for design debug and scan chain analysis. Logic patterns from the design software are compared with the detected logic patterns from the device under test (DUT).
SEMICAPS Configurations	
2001	SEMICAPS 2000 Delivered the first tester docked Scanning Optical Microscope. This machine has an upright configuration.
2004	SEMICAPS 3000 The first inverted microscope system for static laser induced and dynamic laser analysis with a platform that allows docking to any tester.
2005	SEMICAPS 4000 The first wafer level microscope system platform that allows backside analysis. This can be converted to a tester docked dynamic laser analysis system.
SEMICAPS SEM Imaging	
1989	SEM-to-PC Digital imaging First to digitize an SEM image for storage into the IBM PC system.
1992	SEM-to-PC Digital imaging First to acquire a 4k x 4k SEM image digitally.

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