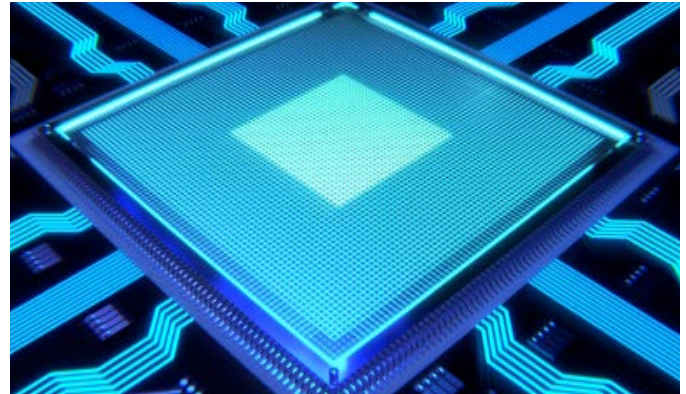


Resolving manufacturing and E&E challenges



MIMOS' Advanced Analytical Laboratory – Failure Analysis and Material Analysis offers services to E&E industry to help improve product quality with low cost of entry and faster time to market.

By Fairuz Mohd Shahar

Failure analysis is a systematic approach to determine how or why semiconductor products or devices have failed. It is an important improvement process for manufacturing and research and development (R&D) activities in developing new products.

Failure analysis is also crucial for bettering the performance of existing products and manufacturing process to ensure continuous throughput improvement with lower operating costs. These advantages can lead to an increase in sales and help enhance the quality of manufacturing companies.

First of all, what is a failure? Failure means the inability of a component or product to function properly or non-conformance of the device to its electrical, visual or mechanical specifications. This is when an investigation takes place where dedicated tools are used to analyse and collect data to figure out the cause of failure, so that corrective actions can be taken.



As the national applied R&D Centre, MIMOS has been providing high value-added services for the industry and academia by offering its technological capabilities and advanced analytical facilities.

One of its labs is **Advanced Analytical Laboratory – Failure Analysis and Material Analysis**, which is equipped with complete spectrum of state-of-art analytical and characterisation instruments such as Transmission Electron Microscope (TEM), Dual Beam System, Time of Flight - Secondary Ion Mass Spectrometry (TOF-SIMS), Auger Electron Spectroscopy (AES) and X-ray Photoelectron Spectroscopy (XPS), just to name a few.

Determining types of failure

MIMOS Advanced Analytical Lab director, Bazura Abdul Rahim said failure analysis could also be defined as a comprehensive investigation of failed integrated circuit (IC) or product to determine the failure mechanisms, root causes and material identification, which is critically needed by the industry in resolving manufacturing and R&D issues.

“Improvement activities will be based on data driven to allow faster turn-around time in resolving manufacturing issues which will impact on reducing scrapped product. This will help to reduce the manufacturing operating cost.

“R&D and manufacturing improvement activities can be carried out using shared infrastructure without any delay,” she explained.

The lab provides analysis of material in any sizes ranging from micrometre (μm) up to nanometer (nm) level, which is an essential tool for nanotechnology R&D activities such as graphene and carbon nanotubes.

The capabilities of the equipment will help to accelerate industry development activities on emerging technology.

“If we were to use an analogy, our lab equipment is equivalent to those in hospitals or medical facilities. In the medical settings, the doctors will use medical equipment such as magnetic resonance imaging (MRI), ultrasound scan and X-Ray to examine their patients.

“But in our case, our equipment is designed for semiconductor where chips and internal components of E&E products are our ‘patients’. For instance, we have scanning acoustic microscope, which functions like an ultrasound, and X-Ray machines to identify and analyse the problems in the products,”

“Our world-class equipment involves detecting failure mode, failure site, failure mechanism and root cause of failure. Types of failures include lifted wire, voids, metal short and contamination,” said Bazura.

The advanced infrastructure, she said, is also designed for talent development to produce knowledge workers in advanced technology and nanotechnology.

“The services come with flexible engagement models to suit the needs of the industry, academia and analytical consultants,” she added.



An enabler to boost local E&E growth

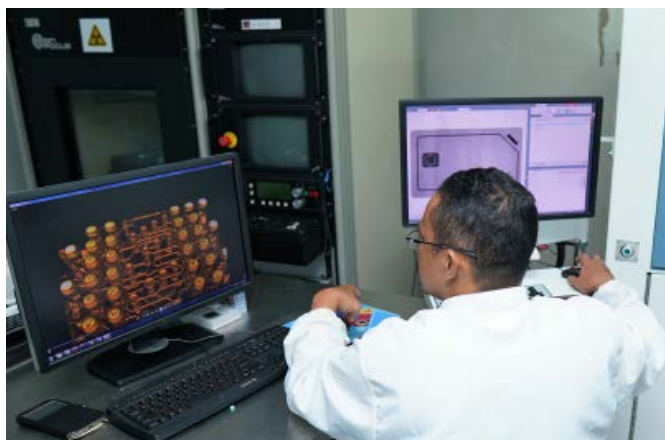
MIMOS Analytical Laboratory has played an active role as an enabler to facilitate the growth of local E&E in Malaysia. It is an important ecosystem to support semiconductor industry that comprises of IC design, wafer fabrication, packaging assembly and board assembly on failure analysis and material analysis.

Having been in business since 2000 to support local E&E industry, the lab is staffed by highly competent engineers and researchers with over 20 years of experience in semiconductor technology, where their knowledge can assist the industries in resolving manufacturing and R&D issues.

The facilities also promote the growth of high value-added activities such as design & development; R&D and technology & development, which in turn allows industry in Malaysia to remain competitive and compete globally.

By using the lab, local E&E industries can enjoy low cost of entry and faster time to market, plus enable them to safeguard local intellectual properties.

To provide one point of entry on analytical services for E&E Industries, MIMOS has formed partnership with numerous academia labs and other private labs in Malaysia.



As of December 2019, the lab has benefitted 355 customers from manufacturing industry; universities; research institutes, government agencies and R&D organisations.

Of the total, 42 percent were from multinational companies; 40 percent from small and medium enterprises; 15 percent from research institutes and universities; and 3 percent from foreign customers.

The lab has received ISO9001:2015 certification and ISO/IEC17025 accreditation and is a verification lab for NanoVerify certification under NanoVerify Sdn Bhd, a subsidiary of NanoMalaysia Berhad.

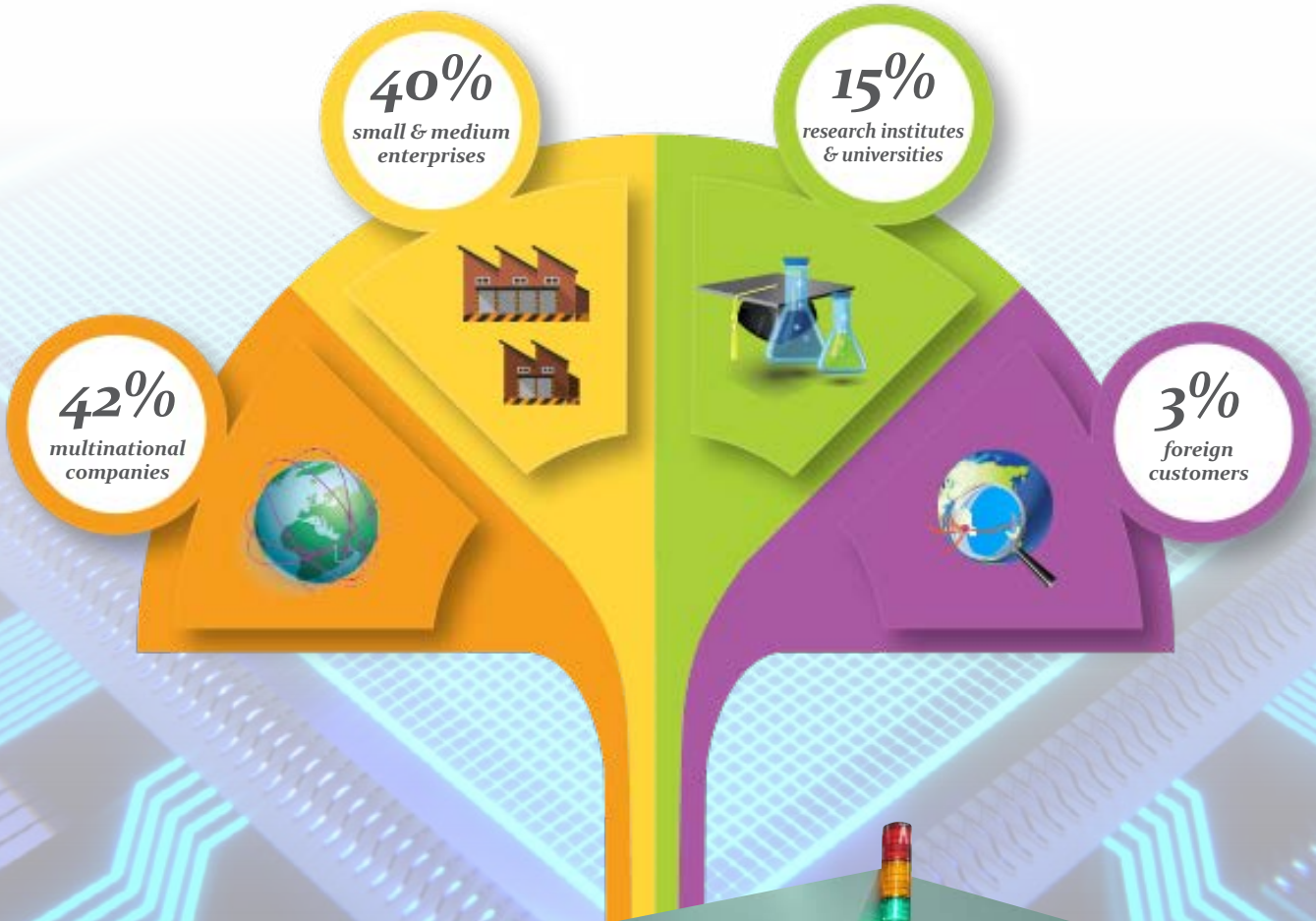
Other achievements include being certified and accepted by Industrial Technology Research Institute (ITRI) for the nm measurements; actively involved in Asian Nano Forum for nm measurement; and receiving excellent customer satisfaction survey rating of 4/5 every year since 2014.

For future plan, MIMOS intends to upgrade the existing advanced analytical instrument with ultra-high resolution requirements to meet world-class capabilities.



As of December 2019:
355 customers have benefitted from MIMOS FA & MA Lab

Of the total:



MIMOS' Advanced Analytical Laboratory – Failure Analysis and Material Analysis

Capabilities

- Real-time X-Ray (2D) & 3D X-Ray
- Curve Tracer (Logic, High Voltage & Current)
- Photon Emission Microscope (PEM)
- Optical Beam Induced Resistance Change (OBIRCH)
- Thermal Emission Microscope
- Field Emission Gun Scanning Electron Microscope (FESEM) + Energy Dispersive Spectrometer (EDS)
- Dual Beam System + Energy Dispersive Spectrometer (EDS)
- Transmission Electron Microscope (TEM) + Energy Dispersive Spectrometer (EDS)
- Time of Flight - Secondary Ion Mass Spectrometry (TOF-SIMS)
- Auger Electron Spectroscopy (AES)
- X-ray Photoelectron Spectroscopy (XPS) + Gas Cluster Ion Beam (GCIB)
- Electron Energy Loss Spectroscopy (EELS)
- Cryo-Microtome
- Nano-indenter and Micro-indenter
- Scanning Probe Microscopy
- Atomic Force Microscopy (AFM)
- Fourier Transform Infrared Spectroscopy (FTIR)
- UV-VIS-NIR
- Laser Scanning Microscope (LSM)
- Surface Profiler
- Laser Decapsulator
- Chemical Decapsulator
- Mechanical Polisher

Testimonials

“Thanks for the quality services provided during the past few years. Beside short analysis cycle time, the details on analysis report also helped us (industries) a lot for daily root cause problem-solving. Overall, thanks for the great services and keep it up.”

Dr. Lai CY
Technical Staff
Infineon Technologies (Malaysia) Sdn Bhd

“My company used the lab since 2015. The lab delivered quality services within schedule. We are very satisfied”

Johan Iskandar Hasan
Managing Director
NanoVerify Sdn Bhd

“Services exceeded client expectations for quality analytical testing. The best accredited lab in Malaysia. Awesome!”

Dr Fakhrozi Che Ani
Senior Manager, Manufacturing Engineering
ScanDisk Storage Malaysia Sdn Bhd

“Excellent material analysis services provided with quick turnaround time”

Dr. Daniel Bien Chia Sheng
Senior Vice President
NanoMalaysia Berhad

“As a local researcher working on electro-optics materials & LED-based support materials - MIMOS offers a comprehensive test & measurement facility for materials characterization with excellent discussion sessions on how best to choose which technique to probe a particular need”

Prof. Dr. P. Prabakaran
Professor
School of Microelectronics Engineering
UNIVERSITI MALAYSIA PERLIS

“MIMOS FA Service Lab is equipped with state-of-the-art testing tools for the study of wide range of materials. Besides impressive facilities, MIMOS has a team of technical experts who are keeping themselves abreast of the industrial requirements and current technology advancements. The industry supporting role by MIMOS is essential for the technical development and business growth in Malaysia.”

Dr. Liang Mei Keat
FA & Materials Consultant
5W2H Consulting Sdn Bhd

“The lab provides a wide variety of failure analysis services at reasonable price with excellent service and turnaround time. Their staff are very helpful and very attentive to customer needs”

Gary Chan
Senior member of technical staff
IXP Semiconductor Sdn Bhd

“The lab has the excellent tool capability and people competency to support the industry’s requirement. The results are always outstanding”

Yong Foo Khong
FA Senior Manager
Silterra Malaysia Sdn Bhd

MIMOS has been a great support and Service Provider to OSI Optoelectronics Sdn Bhd in conducting Failure Analysis using advanced tools like XPS, FESEM+EDS and 3D X-Ray. MIMOS service under leadership of Bazura Abdul Rahim was an exemplary. MIMOS Failure Analysis Team was very supportive and had the knowledge and expertise in conducting various analysis in a very professional manner. We are very happy to use MIMOS services for the needs on Optoelectronic devices and substrate assemblies like PCBs, Ceramic Hybrid Microcircuits, Flex Circuits etc.

Narayanan Ramachandran
Director of Engineering
OSI Optoelectronics

“The lab service provider fully understands my needs and professionally handles my sample without missing the deadline. It is valued for money.”

Prof. Ir. Dr. Cheong Kuan Yew
Professor
School of Materials & Mineral Resources Engineering
UNIVERSITI SAINS MALAYSIA