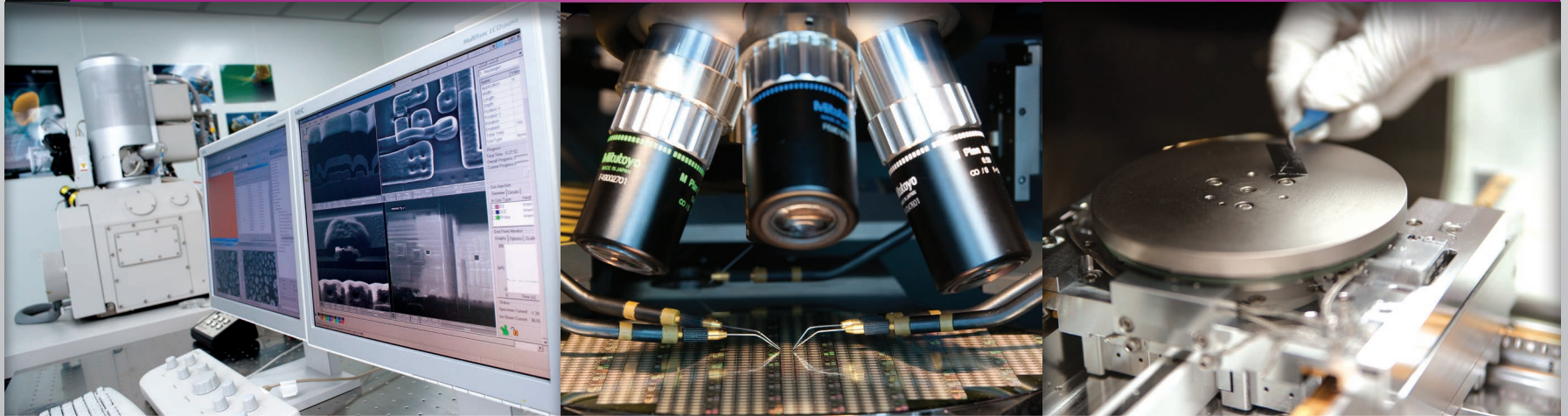




MIMOS
SEMICONDUCTOR

MIMOS R&D SHARED FACILITIES AND SERVICES

FOR E&E INDUSTRY AND ACADEMIA

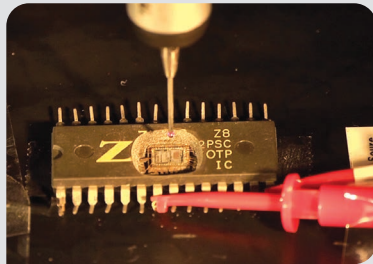


ISO 9001:2015 CERTIFICATION AND ISO/IEC 17025:2017 ACCREDITATION



Innovation for Life™

www.mimos.my

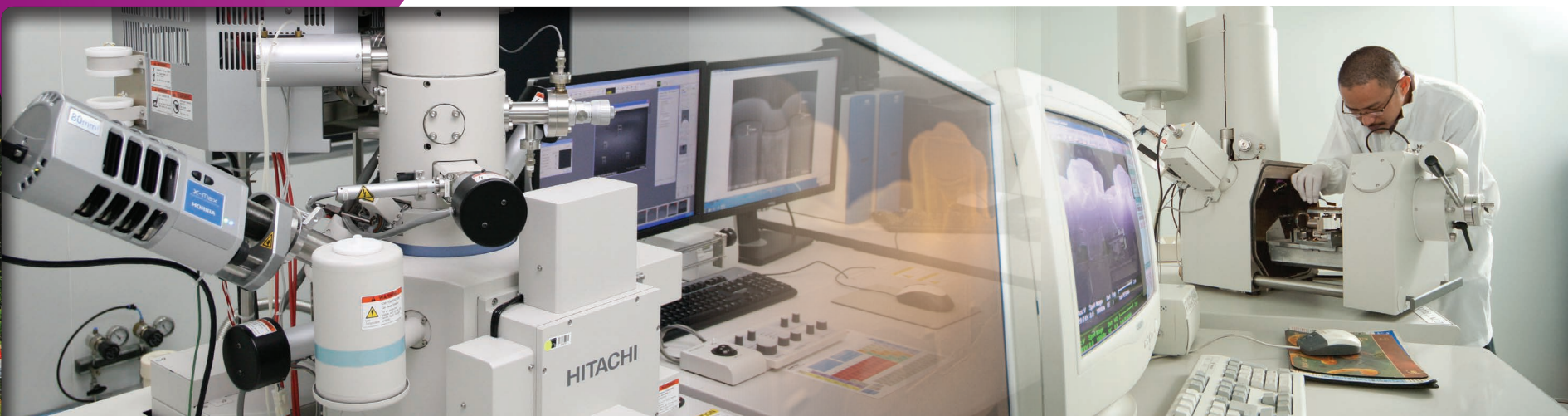


MIMOS SEMICONDUCTOR (M) Sdn. Bhd. provides R&D shared facilities and services as part of the Malaysian Economic Transformation Programme (ETP) under the Electrical and Electronics National Key Economic Area (E&E NKEA).

We aim to be a major catalyst for the development of the E&E industry in Malaysia and the region by offering a flexible engagement model, short turnaround time and integrated value-added services at competitive prices.

Among the services offered are Failure Analysis/Material Analysis, Wafer & IC Testing, Wafer Fabrication & Wafer Prototyping and Hands-On Skills Development Programme.

MIMOS FAILURE ANALYSIS, MATERIAL ANALYSIS & NANOCHARACTERISATION LAB



MIMOS Failure Analysis, Material Analysis & Nanocharacterisation Lab is equipped with a complete spectrum of advanced analytical tools to provide high value-added services for the E&E industry and academia.

The lab is a strategic cross-cutting enabler to complete E&E ecosystem support by providing much needed services in Malaysia.

Innovative and flexible engagement models are offered to suit the needs of the industry, academia and local Failure Analysis consultants.

MIMOS SEMICONDUCTOR has more than 20 years of experience in areas of semiconductor wafer fabrication and devices to ensure optimal analytical solutions.

We are MS ISO/IEC certified and a NANOVerify programme centre.

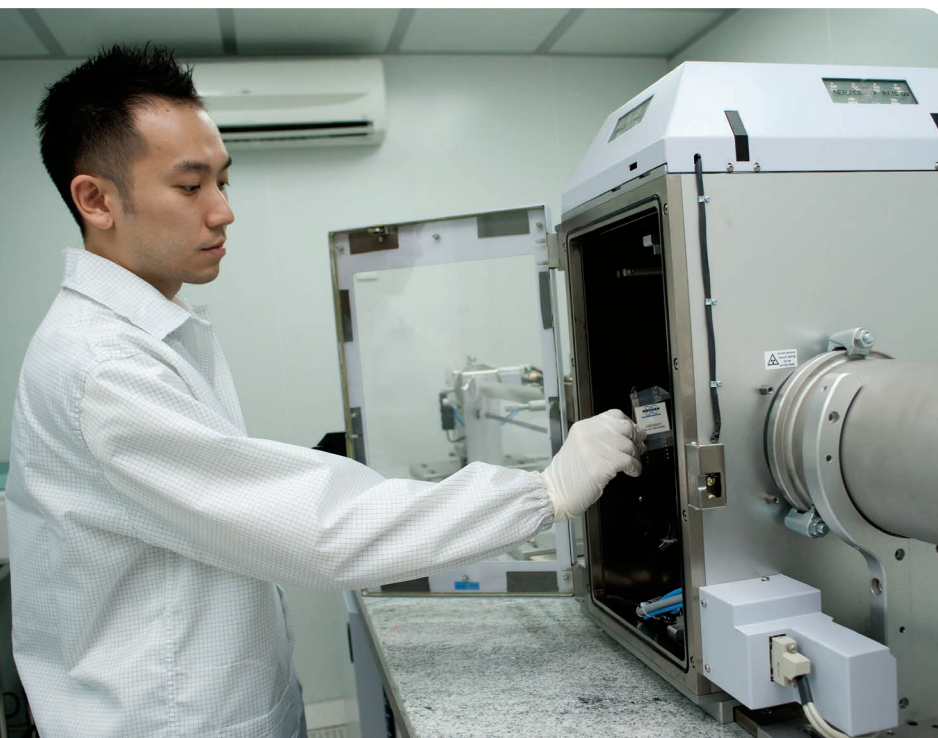
Capabilities

Electrical Verification

- **Logic and High Voltage Curve Tracer**
Electrical/parametric test verification tool for logic and high-voltage devices

Non-Destructive Inspection

- **Real-time X-Ray (X-Ray)**
2D inspection tool to determine internal conditions of sealed devices
- **3D X-Ray**
3D inspection tool to determine internal conditions of sealed devices

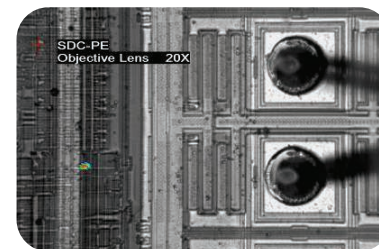
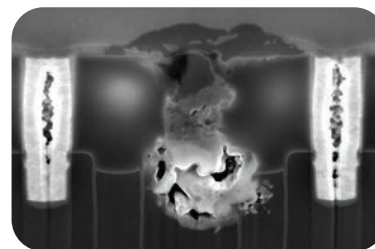


Fault Localisation

- **Photon Emission Microscope (PEM) and Optical Beam Induced Resistance Change (OBIRCH)**
Fault localisation system for low leakage failure and OBIRCH capabilities is to localise metal defects
- **Thermal Emission Microscope**
Fault localisation system for high leakage and shorting

Physical Analysis

- **Laser and Chemical Decapsulator**
Package opening tool for semiconductor packages
- **Confocal and Digital Microscopes**
Visual inspection tool with Brightfield, Darkfield, DIC (interference contrast) and Confocal capabilities
- **Dual-Beam (FIB and FESEM) with Energy Dispersive Spectrometer (EDS)**
High resolution inspection system for precision micro cross-sections of IC features and deposition of conductor and insulator within sub-micron tolerances, and EDS for elemental analysis
- **Field Emission Gun Scanning Electron Microscope (FESEM) with EDS**
Inspection system to examine fine details within nanometre-level resolution and equipped with EDS for elemental analysis



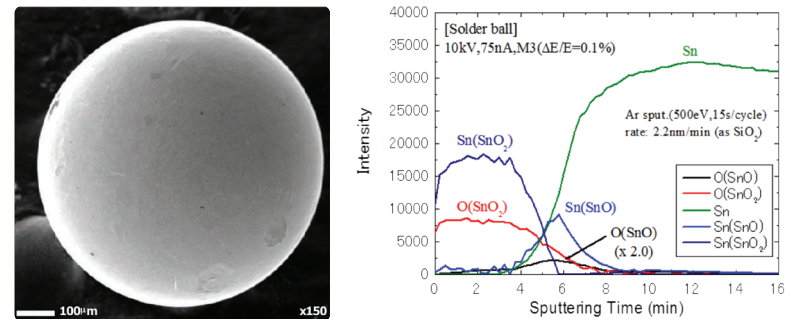
- **Transmission Electron Microscope (TEM) with EDS**
Inspection system to examine fine details within angstrom-level resolution and equipped with EDS for elemental analysis
- **Atomic Force Microscopy (AFM)**
3D imaging profile for topographical information used in surface roughness analysis with RAMAN for chemical and molecular
- **RAMAN**
Non destructive chemical and molecular analysis

Material Analysis

- **Auger Electron Spectroscopy (AES)**
Inspection system to perform minute surface elemental analysis, elemental mapping, depth profiling and chemical state analysis
- **TOF Secondary Ion Mass Spectroscopy (ToF-SIMS)**
Inspection system to perform surface elemental, molecular species analysis (organic and inorganic composite materials), depth profiling and elemental/chemical mapping
- **X-Ray Photoelectron Spectroscopy (XPS) with**
 - **Reflection Electron Energy Loss Spectroscopy (REELS)**
 - **Ion Scattering Spectroscopy (ISS)**
 - **Ultraviolet Photoelectron Spectroscopy (UPS)**
- **TEM Upgrades with Electron Energy Loss Spectroscopy (EELS)**
Inspection system to examine atomic composition, chemical bonding electronic properties (valance and conduction bands), surface property, and element-specific pair distance distribution functions

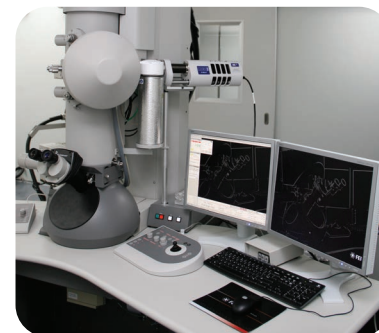
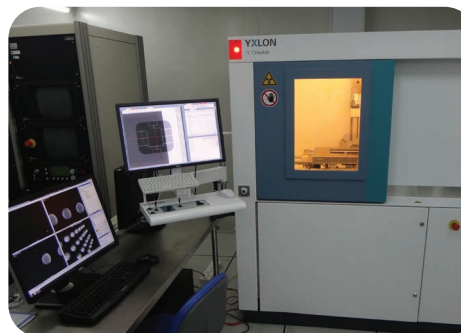
- **Fourier Transform Infrared Spectroscopy (FTIR)**
Inspection system to identify polymers, organics and contamination
- **Ultraviolet-visible and Infrared Spectroscopy (UV-Vis-IR)**
Inspection system to examine absolute specular reflectance, direct transmission / reflection / absorption, scattered transmission / reflection
- **Nanoidentation**
Inspection system to test hardness of small volume of material. It is a mechanical property testing to test the surface of a material.

Chemical state profile of a solder ball

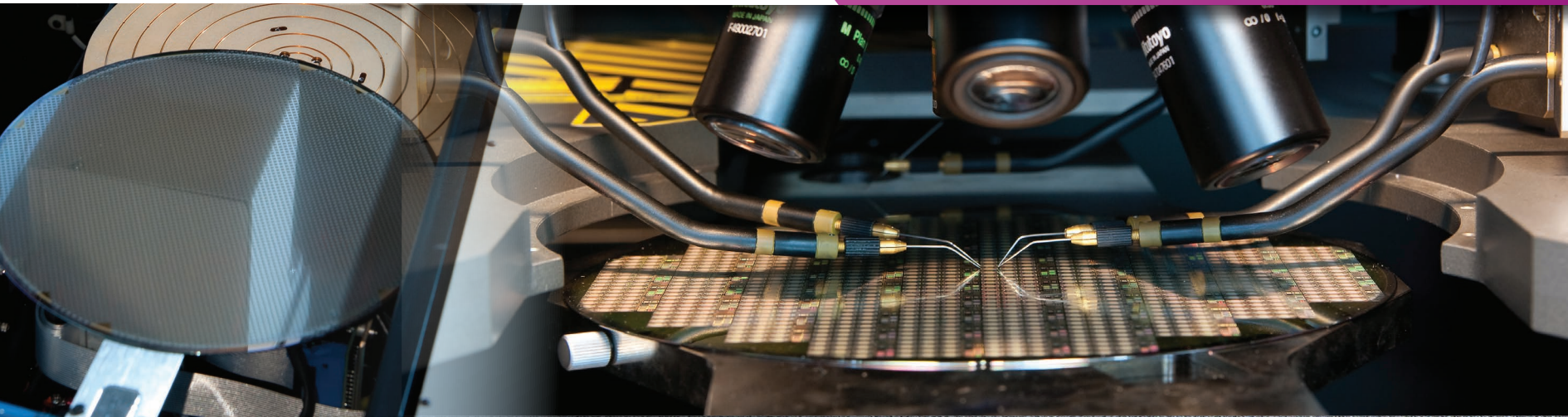


Equipment List

- 2D X-Ray + 3D X-Ray
- Curve Tracer (Logic + High Voltage + High Current)
- Photon Emission Microscope (PEM)
- Optical Beam Induced Resistance Change (OBIRCH)
- Thermal Emission Microscope (Thermal IR)
- Hall Effect
- Laser & Chemical Decapsulator
- Ion Milling / Polishing
- Mechanical Polishing
- Precision Etching Coating System (PECS)
- Scanning Probe Microscopy (SPM)
- Macroindenter + Nanoindenter + SPM
- Stylus Profilometer
- Confocal & Digital Microscope
- Atomic Force Microscope (AFM) – Electrical, Conductive, Magnetic, Liquid
- Energy Dispersive Spectrometer (EDS)
- Electron Backscattered Diffraction (EBSD)
- Wavelength Dispersive Spectroscopy (WDS)
- Electron Energy Loss Spectroscopy (EELS)
- Scanning Transmission Electron Microscope (STEM)
- Cathodoluminescence Microscope (CL)
- FEG-Scanning Electron Microscopy (FESEM) + EDS
- Variable Pressure FEG-Scanning Electron Microscope (VP-FESEM) + STEM + CL + EDS + EBSD + WDX
- Dual Beam (FIB+FESEM) + EDS + STEM
- Transmission Electron Microscope (TEM) + STEM + EDS + EELS
- Cryo Ultramicrotome
- Auger Electron Spectroscopy (AES) – Depth Profiling, Mapping
- Time-of-Flight-Secondary Ion Mass Spectrometry (ToF-SIMS) – Depth Profiling, Mapping
- X-Ray Photoelectron Spectroscopy (XPS) – Depth Profiling, Mapping
- Reflection Electron Energy Loss Spectroscopy (REELS)
- Ion Scattering Spectroscopy (ISS)
- Ultraviolet Photoelectron Spectroscopy (UPS)
- X-Ray Photoelectron Spectroscopy (XPS) + REELS + ISS + UPS
- RAMAN Spectroscopy – UV, PL, Blue, Red, Green
- Fourier Transform Infrared Spectroscopy (FTIR) – MicroATR, Mapping(FPA)
- Ultraviolet-Visible-Near Infrared Spectroscopy (UV-Vis-NIR)



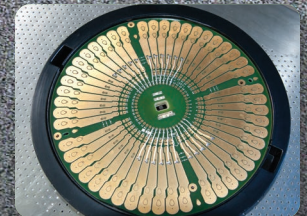
MIMOS WAFER & IC TESTING LAB



MIMOS Wafer & IC Testing Lab provides wafer sort and testing services for processing of up to 200mm wafers. The lab is equipped with Automatic Test Equipment (ATE) for evaluating and testing Digital, Analog/Mixed-Signal (AMS) and Power Devices, and provides engineering support for product prototyping.

The key services provided are:

- Parametric Test (PCM)/Wafer Acceptance Test (WAT)
- Wafer Sort Capabilities/Chip Probe Test (CP)
- Wafer-Level Reliability Testing and Monitoring
 - *Including Hot Carrier Injection (HCI) and Mobile Ionic Contamination (MIC)*
- Device and Interconnect Modelling
- Test Program Development Consultation
- Test Engineering Training
- Test Data Analysis Tools



Capabilities

Parametric Test (PCM)/Wafer Acceptance Test (WAT)

Auto Parametric Test Systems enable semiconductor manufacturers to significantly reduce test time for DC and capacitance measurements in semiconductor wafer manufacturing processes.

- **4072 Auto Parametric Test System**
 - Agilent 4072A Advanced DC Auto Parametric Tester with 4 Source Measurement Units (SMUs) and 48-pin switch matrix
 - Tester is directly docked to Electroglas 4090µ Fully Automatic Prober
- **4073 Auto Parametric Test System**
 - Agilent 4073A Ultra Advanced DC Auto Parametric Tester with 8 Source Measurement Units (SMUs), 48-pin switch matrix and 1fA low current measurement capability
 - Tester is directly docked to Accretech UF200 Fully Automatic Prober with 150°C Hot Chuck capability
- **4082A Auto Parametric Test System**
 - Agilent 4082A Advanced DC Auto Parametric Tester with 4 Source Measurement Units (SMUs), 38-pin switch matrix and high throughput testing
 - Tester is directly docked to TEL Precio Octo Fully Automatic Prober with 150°C Hot Chuck and 150µm Thin Wafer capability

Wafer Sort Capabilities/Chip Probe Test (CP)

Wafer-level functional chip testing provides sorting of good and fail die binning to ensure cost-effective assembly and support further test processes. There is available tester integration to Electroglas 4090µ Fully Automatic Prober with 150°C Hot Chuck or TEL Precio Octo Fully Automatic Prober with 150°C Hot Chuck and 150µm Thin Wafer capability.

- **Analog/Mixed-Signal Test Sytem**

LTXC ASL1000 Tester for advanced linear and analog/mixed-signal markets

- **Functional Test System (Microcontroller and Consumer ICs)**

LTXC Diamond 10 (D10) Tester is a low-cost and high-throughput production test solution with speeds up to 200MHz and a 96-pin digital channel

Wafer-Level Reliability Testing and Monitoring

Wafer-level reliability determines the reliability and lifetime of devices at wafer level to ensure faster characterisation, even prior to packaging.

- **Plasma Damage and Hot Carrier Injection (HCI Degradation) Test System (Automatic)**

PDQ-WLR Test Software and PDQ-AT Analysis Software for Hot Carrier Injection (HCI) and Plasma Damage integrated to MIMOS 4073 Auto Parametric Test System

- **Mobile Ionic Contamination (MIC), Electromigration, CV Measurement and Gate Oxide Integrity Test System (Manual)**

Keithley CV and IV System bench equipment with up to 250°C Hot Chuck capability for Bias Temperature Stress (BTS) characterisation

Device and Interconnect Modelling

This modelling method determines the circuit simulator models for behaviour of electrical devices based on fundamental physics and wafer fab processes to ensure accuracy of integrated circuit (IC) designs.

- **Device Modelling and Simulation for Device & IC Design (BSIM3v3)**

Integrated Circuit Characterisation and Analysis Program (ICCAP) device modelling software and SPICE Circuit Simulation

- **Interconnect Parasitics Modelling**

Mentor Graphics XCalibrate modelling software

Bench Test Equipment

Bench test equipment allows for verification of auto tester results and manual test investigation. This is available with Micromanipulator 8060-FS8-V0-1-C Manual Probe Station (with and without light-tight enclosure), Temptronic TP0315A-TS-2 Temperature Controller (from 25°C to 250°C) and Metric ICS software.

- **Keithley CV System**

Keithley 230 Programmable Voltage Source, Keithley 595 Quasi Static CV Meter and Keithley 590 High Frequency CV Analyser

- **Keithley IV System**

Keithley 236 Source Measurement Unit and Keithley 2361 Trigger Controller

- **HP IV System**

HP 4145B Semiconductor Parametric Analyser

Wafer Thinning Services

Also available is a complete backgrinding system for wafers inclusive of taper and detaper.

- **Backgrinding System**

Disco DFG840 Wafer Back Grinder (with capability to backgrind wafers up to 250µm thickness), Takatori ATM-1100E Wafer Protective Tape-Laminating Machine (Taper) and Takatori ATM-2100D Wafer Protector Tape Remover (Detaper)

Data Analysis

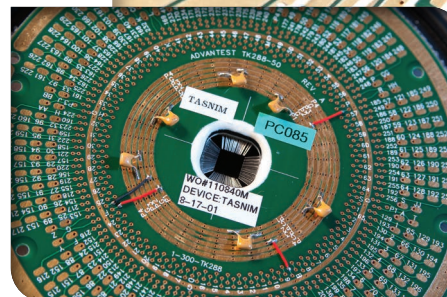
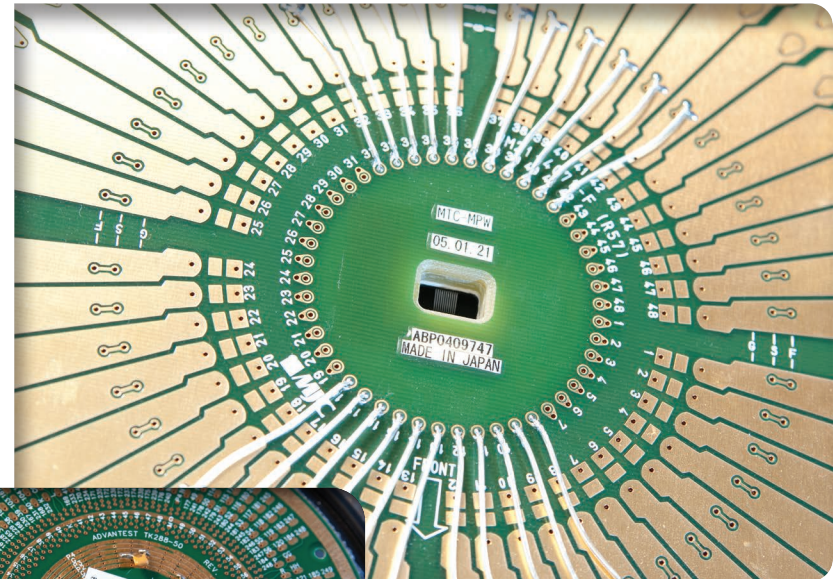
For in-depth process and yield, these software provide statistical analysis and integrated data analysis.

- **Standalone Tools**

JMP and Minitab Statistical Analysis Software

- **Integrated Data analysis**

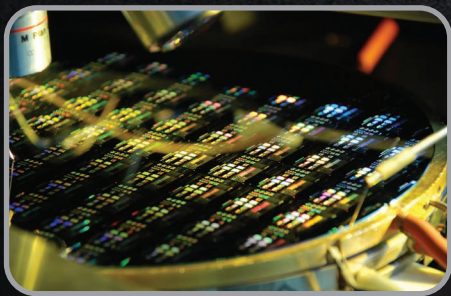
Galaxy Examiner Pro Software (for data testing, device characterisation, test program qualification and yield analysis from standard semiconductor data files integrated to MIMOS Automatic Testers)



MIMOS WAFER FABRICATION & WAFER PROTOTYPING LAB

MIMOS SEMICONDUCTOR second facility, Fab 2, produces 200mm wafers at medium volume capacity. Our operation is backed by robust technologies from IMS Germany and NTT Japan.

The 200mm wafer fabrication plant is fully-equipped with industry-standard technology as well as machinery, to cater to various industrial and research requirements. We are able to provide a wide range of services including Design Support, Customised Processes, Multi-Project Wafer (MPW) programmes and Product Development & Fabrication in CMOS, HVMOS, Digital, Analog and Microelectromechanical Systems (MEMS) technology platforms.



Capability	Process Technology	Process Description	Features
CMOS	0.35 μ m	CMOS Analog/Mixed-Signal Technology	2P3M, 3.3V I/O, Device Model Verification
	0.5 μ m		2P2M, 5.0V I/O, Device Model Verification
HVMOS	0.2 μ m	Trench HVNMOS	Low RDSon, Trench, 20V and 30V Manufacturing Proven
	0.4 μ m		Low RDSon, Trench, 60V and 70V Manufacturing Proven
Schottky Diode	0.2 μ m	Trench Schottky Diode	Low Vf, 45V and 60V Manufacturing Proven

Equipment List

- Furnaces for Annealing and Various Film Deposition/Growth
- High Clean Bench
- Low Clean Bench
- Etch Bench
- Aluminum Etch Bench
- Metal Etch (Silicide Etch)
- Wafer Scrubber System
- Solvent Bench System
- High Current Ion Implanter System
- Medium Current Ion Implanter System
- Physical Vapour Deposition (PVD) System
- Rapid Thermal Processing (RTP) System
- Spin-on Glass (SOG) Coater System
- Film Stress Measurement System
- Four Point Probe System
- Fourier Transform Infrared Spectroscopy (FTIR)
- Wafer Marker
- Surfscan Inspection System
- Plasma Enhanced Chemical Vapour Deposition (PECVD) for Silicon Dioxide and Silicon Nitride Deposition
- Tungsten Silicide CVD System
- Tungsten CVD and Etchback System
- Sub-Atmospheric Chemical Vapour Deposition (SACVD) System
- Chemical Mechanical Polishing (CMP) System
- Bare Wafer Inspection System
- Reactive Ion Etching (RIE) equipment for Films (Oxide, Nitride, Poly, AlCu, AlSiCu, Silicon) Etching
- Poly Backside Etcher
- Resist Asher
- Step Height System
- Film Thickness Measurement System
- Ellipsometer System
- Stepper System
- Scanner System
- Coater/Developer
- Deep Ultra Violet (DUV) System
- Oven System
- Overlay System
- Pattern Wafer Inspection System
- Critical Dimension Scanning Electron Microscope (CDSEM) System
- Inspection Microscope System



MIMOS HANDS-ON SKILLS DEVELOPMENT PROGRAMME



With over 20 years' experience in Wafer Fabrication, Failure Analysis, Wafer & IC Testing and IC Design. MIMOS SEMICONDUCTOR offers on-the-job, high-end customised training schemes based on real industry needs. To date, we have trained more than 1,200 engineers to become highly qualified experts in semiconductors. Courses are built on a 20:80 ratio of theory and hands-on experience.

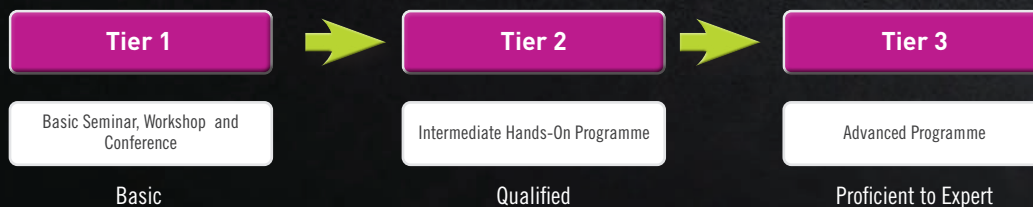
The skills development programme focuses on:

- 1) Wafer Fabrication Processes
- 2) Failure Analysis
- 3) Reliability Testing
- 4) Semiconductor Testing
- 5) Integrated Circuit Design

Programme Objectives

- Equip undergraduates with relevant industry experience through structured development schemes
- Enhance graduates' and engineers' skills through upskilling and advanced skills development courses
- Experiential hands-on learning environment using MIMOS' industry-grade facilities

Development Programme Track



CONNECT WITH US

BUSINESS AND TECHNOLOGY COLLABORATION

MIMOS SEMICONDUCTOR (M) Sdn. Bhd. provides Failure Analysis/Material Analysis, Wafer & IC Testing, Wafer Fabrication & Wafer Prototyping and Hands-On Skills Development Programme. We offer a full chain of services with excellent business value through technology collaborations with fabless design houses, end product customers and technology partners.



MIMOS
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ENERGISING MALAYSIA'S E&E ECOSYSTEM

MIMOS R&D SHARED FACILITIES AND SERVICES



Wafer Fabrication

- Product Prototyping
- Metrology
- Customised Processes



Advanced Skills Development

- Industry Approved
- Fully Hands-On
- Industry-Grade Facilities



Advanced Analytical Lab

- Electrical Analysis
- Physical Analysis
- Material Analysis