Guyline (Asia) Ltd.

GUYLINE (ASIA) LIMITED

Semicon, Surface & Material Science

CIQTEK - NMR, EPR, TEM, SEM & Diamond NV Microscopy - China

CIQTEK is the most advanced scientific instrument manufacturer in China. Products include:

- **NMR:** The CAN600 is a next-generation intelligent liquid-state **nuclear magnetic resonance (NMR) spectrometer**, equipped with an ultra-shielded, ultra-homogeneous **600 MHz** superconducting magnet. It is an advanced distributed system with a integrated modular console, and high-sensitivity, fully automated tuning probes. CAN600 features highly integrated transceiver RF channels, enabling multi-receiver experiments. Novel design supports rapid tuning and shimming, significantly reducing the time required for experiment setup. Accessories such as the intelligent control touchscreen makes system's control/monitor simple. By combining high-performance hardware with intelligent software, CAN600 delivers a more reliable and user-friendly NMR platform for researchers.
- Scanning Electron Microscope (**SEM, FIB-SEM, FE-SEM**): Nine different models are offered to suit all possible application needs
- Transmission Electron Microscope (**120 kV Field Emission TEM**): Users could operate in a separate room to reduce environmental interference to the experiment. Software integrates efficiently to provide fully automated processes, allowing efficient TEM interaction with real-time monitoring. System could be equipped with a field emission electron gun. Sufficient ports/interfaces are built for future needs.

NMR

TEM

EPR/ESR

- Electron Paramagnetic Resonance (**EPR/ESR**): Three models (X-Band Benchtop Electron Paramagnetic Resonance Spectrometer, X-Band CW-EPR Spectrometer, and X-Band Pulse EPR Spectrometer) are available.
- Widefield **Nitrogen Vacancy** (NV) Microscope: A wide-field magnetic microscope based on the principle of Nitrogen-Vacancy (**NV**) Optically Detected Magnetic Resonance (**ODMR**), which has the features of high spatial resolution, large field of view, large dynamic range of detectable magnetic field, and fast imaging speed. It's compatible with ambient environments to cryogenic & vacuum extreme environments.
- **Scanning Nitrogen Vacancy (NV) Microscope**: It is a **Nanomagnetic Imaging Microscope** that combines optically detected magnetic resonance (**ODMR**) of diamond nitrogen-vacancy centers with the scanning probe technique. This combination can be applied to the research of spintronics, multiferroic, 2D magnetic material, superconductors, etc **There are two versions: the ambient version and the cryogenic version.**
- **Many Others……**

Scanning NV Microscope

Hi-Resolution FESEM

Widefield NV Microscope

Semicon, Surface & Material Science

Epitaxy Tech - Epitaxy Instruments - China

Thin film coating instruments with atomic scale precision is devoted for quantum materials research and application. All these are results came from patented inventions and advanced processing techniques in areas of vacuum control, vacuum heating, motion and laser control.

Laser Molecular Beam Epitaxy

Products and technologies include:

- Laser Molecular Beam Epitaxy
- Pulse Laser Deposition
- UHV Magnetron Sputtering
- Chemical Vapor Deposition
- RHEED System
- **Many Others……**

Pulse Laser Deposition

UHV Magnetron Sputtering

Laser Molecular Beam Epitaxy

Chamber: UHV chamber, including an in-situ laser energy monitor, vacuum control and measurement
system, sample stage with laser heating system, scanning target stage system.

Load-lock: Cylindrical vacuum chamber, including vacuum pump, ultra-high vacuum window, main chamber interconnection port, magnetic transfer rod, etc.

Optional: Torr-RHEED, High-throughput system

Pulse Laser Deposition

Target: Patented special target holder greatly extends the lifetime of the target stage and guarantee precise positioning control.

Heater: Infrared laser heating solves the problem of easy breakage of resistance heater heating wires.

Chamber: Carefully designed chamber structure and layout allow users to produce high-quality epitaxial films even without the assistance of RHEED system

UHV Magnetron Sputtering

Load-lock: Compatible with magnetron sputtering and glove box

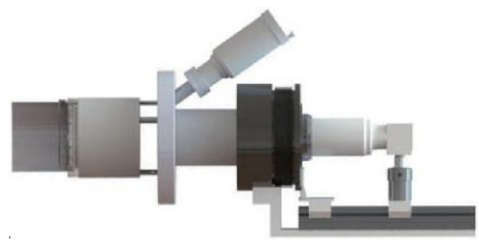
Turbo pump: 700 L/s
Transfer arm length: 600 - 1000 mm

Roughness: RMS <0.1 nm

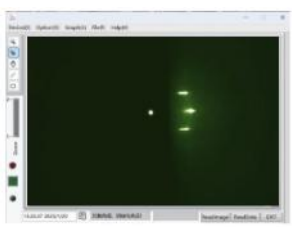
Sample size: 1-8 inch

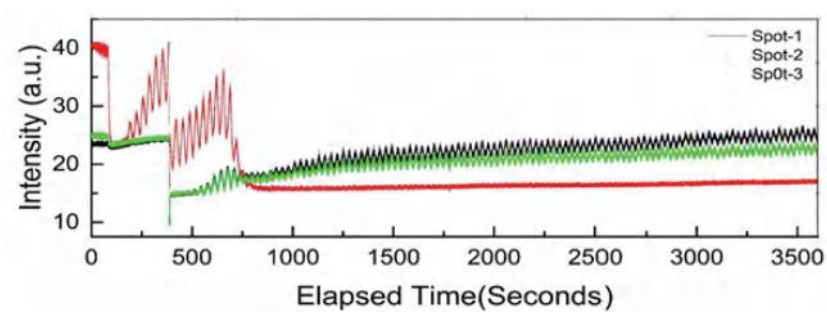
Mode: ON/Off Targets

Pressure: 5×10^{-9} Torr



RHEED System





Performance of the RHEED System

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GUYLINE (ASIA) LIMITED

EPITAXY
Anhui Epitaxy Technology Co., Ltd

Product Gallery

Laser Molecular Beam Epitaxy

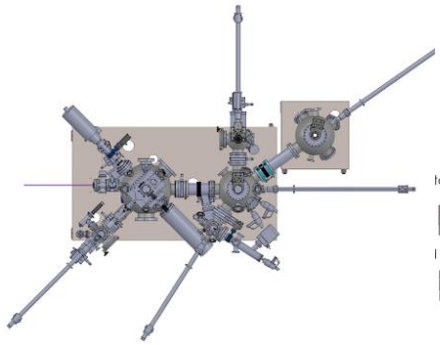
Nano Pulse Laser Deposition

UHV-Magnetron Sputtering

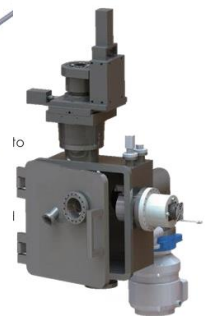
Pulse Laser Deposition

Molecular Beam Epitaxy

Desk Top Magnetic Sputtering

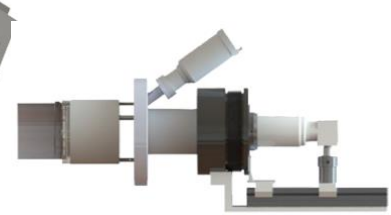


Chambers & magnetic rods interconnection

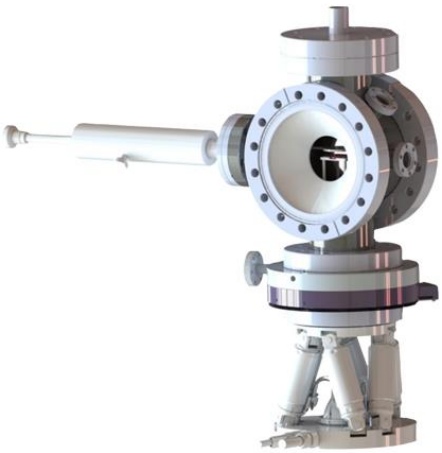


Ion Coating

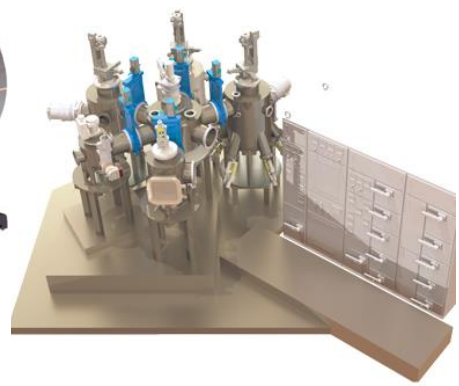
Standard CVD



RHEED System



Synchrotron Characterization (in-situ)



UHV Multi-chamber Inter-connect System

Controllers: Turbo Pump, Laser Heater

Controllers: Stepper Motor, Solenoid Valve

Controllers: Temperature, Laser Actuator

Semicon, Surface & Material Science

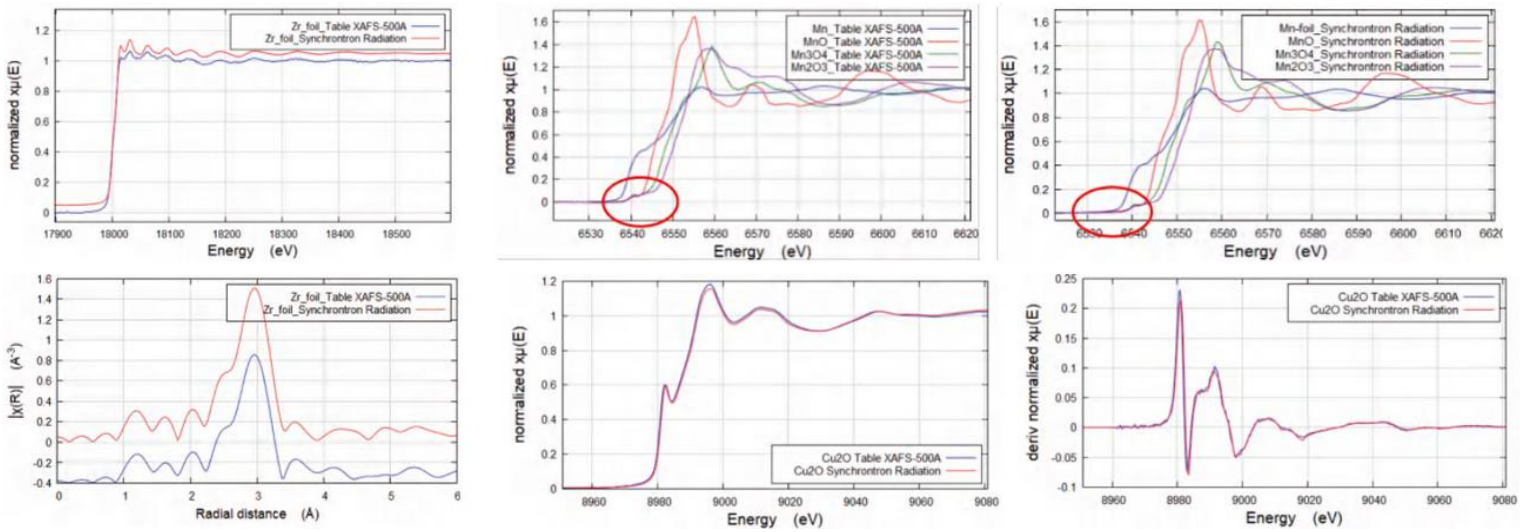
SPCREATION - XAFS - China

XAFS mainly measures the absorption rate changes at and near the K/L absorption edge of elements. This is widely used to diagnose the local characteristics of materials, such as the valence state, coordination number, configuration and bond length of core atoms.

The spectrometer system adopts a Rowland circle structure and large-sized curved crystal components, and uses conventional X-ray sources to achieve spectral measurement of "Testable" XAFS freedom.

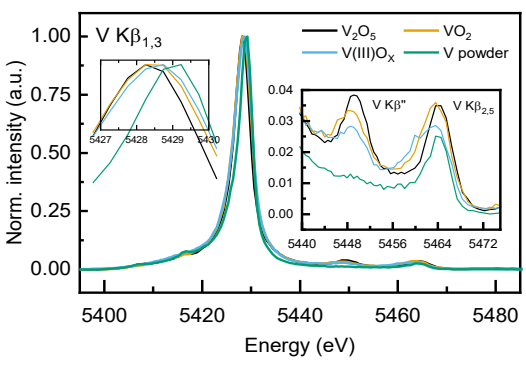
Product Features

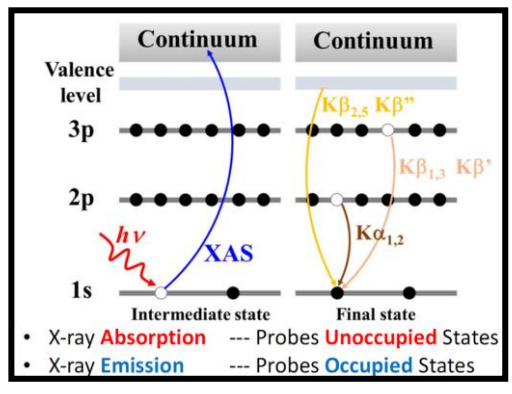
- Supports near-side quick scan function
- One-click automatic switching between different samples and different measurement modes
- Supports extended functions such as in-situ testing & XES
- Remote data transmission, real-time display of experimental status. Supports unattended testing
- Ergonomically engineered, convenient to operate
- Professional application and technical support including data analysis support
- Built-in patented software and preset experimental parameters to achieve fast measurement
- Instrument has radiation exemption qualifications and multiple safety protection interlocks to ensure Operation Safety.

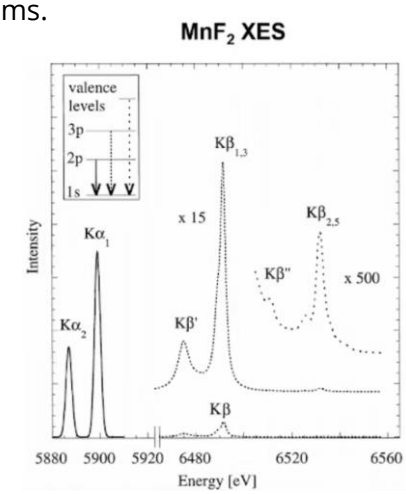


XES Measurement Mode

XES comes from the fluorescence produced by orbital electron de-excitation. It is an important supplement to XAFS. XAFS + XES = absorbs the full orbital electronic structure information of atoms.







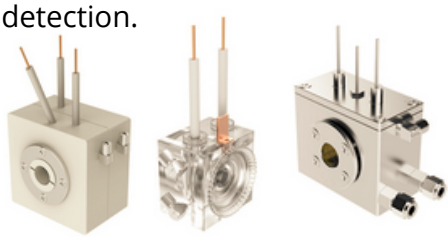
Semicon, Surface & Material Science

Products provided by XAFS

XAFS mainly measures the absorption rate changes at and near the K/L absorption edge of elements, and is widely used to diagnose the local characteristics of materials, such as the valence state, coordination number, configuration and bond length of core atoms.

This low-energy X-ray absorption spectrometer uses X-ray fluorescence spectroscopy (XRF) technology to excite fluorescence by irradiating X-rays onto the sample. It uses Johansson bent crystals to gather the fluorescence onto the detector, which can detect real-time spectra. At the same time, the bent crystals move linearly to change the Bragg angle at different positions to obtain the full energy spectrum.

A high-precision 2-D crystal orientation instrument uses the principle of X-ray diffraction (XRD) to invert the angle Δθ between the local crystal surface and the mirror by measuring the Bragg angle change when the crystal rotates around the normal line to different azimuth angles, and achieves this through 2-D scanning The depiction of the entire crystal plane Δθ ultimately enables two-dimensional, crystal plane error detection.



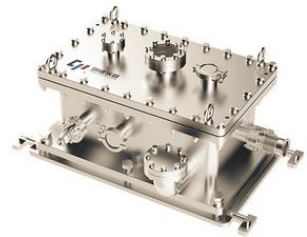
In-situ sample cells

Electrochemical in-situ cell is designed for carrying out desktop XAFS experiments. It is mainly used in XAFS transmission mode. Equipped with Kapton film window, three-electrode design, and adjustable liquid layer thickness. It is equipped with an ion exchange membrane, it realizes the function of H-type electrode and compatible with strong acid/alkali electrolytes to carry out various experiments.

A high-temperature in-situ cell is designed for gas-solid in-situ XAFS experiments such as Fischer-Tropsch synthesis at high temperature. it is equipped with a heating resistor water cooling system and a control system to achieve a high temperature environment of up to 500°C.

Vacuum UV spectrometer

This vacuum UV spectrophotometer uses a D_2 lamp source and have the light focused to the monochromator under vacuum. It uses dual PMT detectors to collect signals. Dedicated software is used to analyze the collected signals to measure the absorption spectrum and get sample characteristics.



Extreme UV polarization detector

This polarization detection system uses the reflectivity and phase delay characteristics of extreme ultraviolet light of the film to accurately measure the polarization of the light source. Its core component is the analyzer. Energy information at different angles can be obtained by rotating the analyzer, and combined with theoretical analysis, information on the total intensity, long axis, and short axis of elliptically polarized light can be obtained.

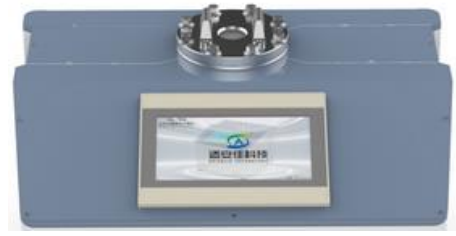
SAJ - Sputtering Device & Supercritical Fluid Dryer - China

This **Sputtering Device** is specially designed for SEM sample Preparation. Device comes with Au target (Pt, Cu are optional).

The **Supercritical Fluid Dryer** is specially designed for drying of delicate materials such as wafers (from 4" to 12"), MEMS or others.

Device is assembled in cleanroom environment.

Sputtering Device

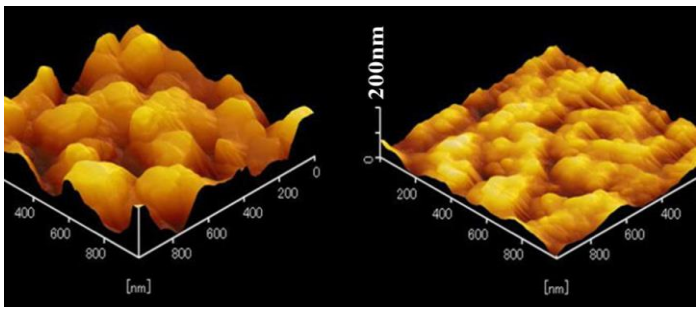


SF Dryer for Wafer & MEMS

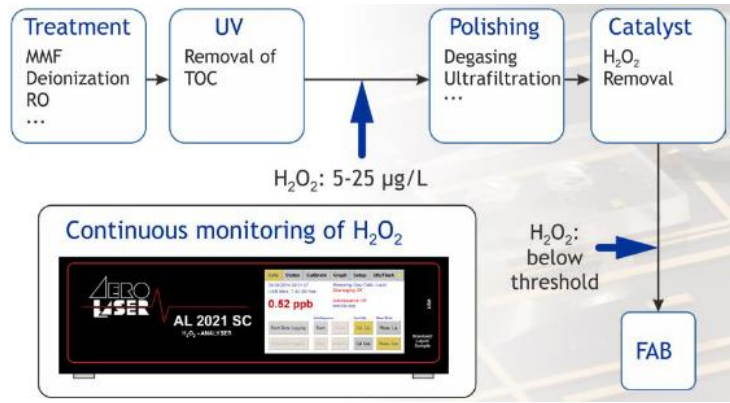
Semicon, Surface & Material Science

Aero Laser - H_2O_2 Measurement - Germany

Semiconductors: As the semiconductor industry pushes the boundaries of miniaturization and efficiency, the purity of ultrapure water (UPW) used in production becomes increasingly critical. The AL2021 H_2O_2 monitor ensures that the water used in the creation of semiconductors is free from H_2O_2 residues, safeguarding the integrity of these microscopic marvels.



AFM images of a Cu-surface after rinsing with UPW containing H_2O_2 (left) and without H_2O_2 (right)
D. Yano, et al., ECS Transactions, 58 (6) 151-158 (2013)



H_2O_2 Monitor for UPW

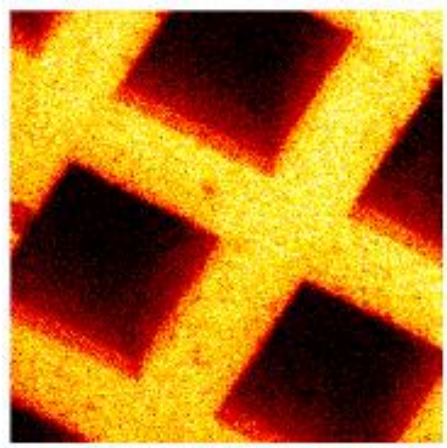
Kore - TOF-SIMS - UK

Providing surface analysis with imaging and chemical mapping (with optional profiling too).

- Mass resolution >3000 m/δm
- Sensitivity > 1x10^9 atoms/cm^2
- Spatial resolution ≤ 0.5 µm
- Affordable TOF-SIMS technology
- High sensitivity
- 25kV liquid metal ion gun

Applications

- Surface Chemistry
- Microstructure surfaces
- Patterned devices (semiconductor, etc)
- Failure analysis at mm scale
- Surface contamination
- Trace analysis (ppm in surface)



Copper grid with 12.7µm repeat unit

Surfacseer I

PhysiChem - Gas & Vapor Absorption Instruments - China

Surface characterization technologies include:

- Physisorption Analyzer
- Chemisorption Analyzer
- Helium Pycnometer
- Capillary flow Porometer
- Porosity Analyzer
- Sample Preparation

Physical & Chemical Sorption

Helium Pycnometer

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