

Semiconductor characterization for R&D and analytical laboratory



Measurement

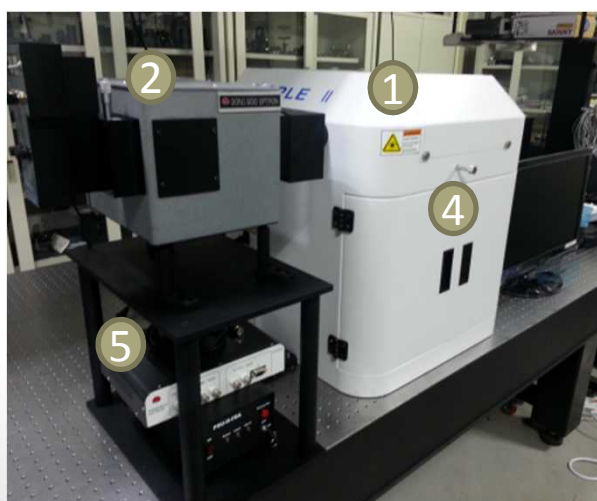
- Room Temp Micro Photoluminescence/Mapping
- Room Temp Micro Photoluminescence Excitation(Absorption) /Mapping
- Low Temp Micro Photoluminescence
- Room Temp Thickness

Application

- Analysis of structural defect of SiC like as SFs(Stacking faults) and TDs(triangular defects)
- Semiconductor characterization and testing (III-V materials)
- GaN/ZnO LED wafer surface characterization (Surface contaminant, uniformity, Reflectivity and Thickness test)
- Sensor development for NIR CCD
- with Thermoelectric Element(PBS, PBSE rod)
- Development of Material of LED
- TDIPL & IQE
- III-V materials PL

Technical specifications

| | |
|------------------------|---|
| Detecting range | 200 – 5,000 nm |
| System resolution | 0.045nm @1200gr/mm grating/ CCD resolution -0.08 nm @1800gr/mm grating |
| Spatial resolution | 1um/(other resolution available on request) |
| Spectrograph | Aberration corrected high throughput 1024x256 pixel format 95% QE, - 100 degrees celcius TE cooling (max.) Dark current : 0.0005e-/pixel/sec |
| Detector | TE cooled high performance CCD/PMT /Phtodiode |
| Laser power control | 0.1% ~ 100 % (up to 6 different power level and other level available on request) |
| Laser excitation | Deep UV ~ NIR (up to 3 different source available) |
| Sample stage | XY Scanning stage Travel range : 76 mm x52 mm Repeatability : < 1 um Resolution(min.) : 0.05 um(min.) 0.1 um(typical) |
| Vision system | For Sample Image & Input beam position monitoring Max. 1600x digital image CCD camera with IEEE 1394 interface |
| Automation(on request) | Software controlled laser rejection filter and Variable ND filter set to adjust input beam power Step motor scanning turret |
| Objective lens | Spectral range : 200 – 1700 nm 10X, 50X & 100X Plan lenses |
| Beam spot size | <1 um @ 100X objective |



1. Sample chamber
(Large area sample space for optional EL PLE LT & Mapping Application)
2. Monochromator with PMT detector
(One side entrance / side exit slits)
3. Port for optional Cryostat system(optional)
(~4K He , 77K liquid nitrogen type available on the sample plate in sample area)
4. Selection bar to switch the mode between Vision & signal detection
5. DAD-1602U, USB type AD convertor board

System laser

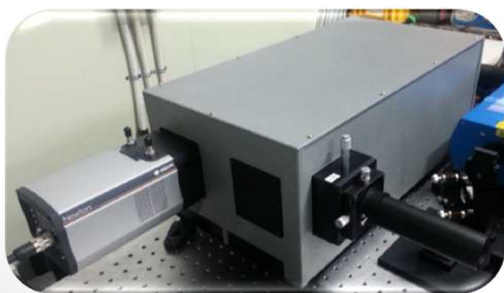
| Parameter | | | | |
|-------------------------|--------------------------|----------------------|--------------------|---------------|
| Measurement | PL | PL/Raman | PL/Raman | PL/Raman |
| Wavelength (nm) | 266+/-1 | 325 | 532 | 785 |
| Spectral line width(nm) | - | - | - | <1nm |
| Output power | 100mw | 50mw | 100mw | 120mw |
| Mode | Near TEM00 Elliptical | TEM00 | TEM00 | TEM00 |
| Operating mode | Pulsed | CW | CW | CW |
| Beam dia.(mm) | 0.5x2mm | <1.2 | <2.0+/-0.2 | <0.8 |
| Beam divergence(mrad) | - | <0.5 | <1.5+/-0.2 | - |
| Mode Quality(M2) | - | - | <1.2 | <1.3 |
| Polarization | - | Linear(>500:1) | Linear(100:1) | Linear(100:1) |
| Power stability(%) | <10(4hr) | <+/-2.0(4hr) | 3 (over2hr) | +/-2 |
| Operating Temp. | 10~35C | 10~60C | 10~35C | 15~45C |
| Life time(Hr) | 8,000 | 2,000 | 10,000 | - |
| Power supply | 90 - 264VAC | 100~240V, 50/60Hz | 85~240V 50/60Hz | 110~220V |
| Fiber optic Option | Available | Available | Available | Available |



DongWoo Optron Co., Ltd.

System Monochromator

| Parameter | |
|-----------------------|---|
| Application | Spectrum analyzer , monochromatic light source |
| Focal length | 500 mm |
| Aperture ratio | f/6.5 |
| Optical design | Czerny-Turner, Imaging spectrograph by Toroidal |
| Optical port | Adjustable side entrance and two exit slits |
| Mechanical scan range | 0~1,200 nm |
| Operating range | 330 nm ~ 2,600 nm |
| Gratings turret | Triple grating turret controlled by Software With 1200gr/mm 500 nm blz , 1200gr/mm 850 nm blz. 600gr/mm 1600 nm blz gratings |
| Resolution | 0.045 nm |
| Dispersion | 1.7nm/mm |
| Accuracy | +/-0.1 nm |
| Repeatability | +/-0.04 nm |
| Focal plane size | 26mm wide x 14mm high |
| Detector coverage | 41nm @ 1200gr/mm grating |
| Slit | A micrometer controlled adjustable slit assembly for one entrance and two exit ports 0 to 5mm(10micrometer increment/decrement unit) |
| Interface | RS232 & USB standard |
| Size/Weight | 546(L)X258(W)X224 mm(H)/15Kg |



DongWoo Optron Co., Ltd.

System detector

| Parameter | | | |
|-------------------------|---|--|-------------------------------|
| Application | Photoluminescence, Raman, Reflectance & Transmittance | | |
| Detector type | PMT | IGA(InGaAs) | PBS(PbS) |
| Spectral range | 185~900 nm | 800~1,700 nm | 1,000~2,800 nm |
| Sensing Area | 24 mm | 3 mm dia | 3 mm dia |
| High voltage | 0~800 V(Max1200) | | |
| Cooling system | Non cooled | TE Cooled | TE Cooled |
| Responsivity (V/W @ pk) | | $0.9 \times 10^8 / 10^7$ | $10^7 / 10^6$ |
| Output signal type | Voltage/Curr ent | Voltage | Voltage |
| Noise | | $5 \times 10^6 / 0.5 \times 10^6$ (V/Hz) | $3 \times 10^5 / 10^6$ (V/Hz) |
| Operating temperature | 50 ~ -30 C | 22 ~ -30 C | 22 ~ -30 C |
| Response time | 2.2ns(anode pulse rise time) | 2 u sec(min.) | |
| Power requirement | AC110 ~ 220V /1.2 A 50/60Hz | +/-9VDC to +/-15VDC | |



- PDS-1, PMT detector



- Photodiode detector

Low temp option

| Parameter | |
|--------------------------|--|
| Application | TDIPL(Temperature Dependant PL) IQE(Internal Quantum Efficiency) |
| 10K Cryocooler | Closed Cycle Cryocooler |
| Vacuum shroud | Welded stainless steel for high vacuum environment in sample compartment |
| Temperature range | 10 ~ 325 K |
| Stability | 0.1K |
| Sample area | 36 mm dia. & 39 mm height Maxi sample size to hold : 20 mm dia. |
| Window | High purity Quartz material 90degree apart window port(4ea) |
| Cooling capacity | 0.4 ~ 0.5 W (10K) |
| Cooling time | 50 min to 20K 70 min to minimum |
| Noise level | 60dBA |
| Input voltage | 208 ~ 230V /50Hz or 190 ~ 210V/60HZ Power usage : 1.2 kW~1.3kW |
| Typical maintenance time | 12,000 hours |
| Vacuum pump system | Turbo molecule pump system |
| Head dimension | Overall length : 562 mm Rotational clearance : 200 mm |
| Compressor dimension | 483x434x516 mm(H) |
| Ambient Temperature | 12 ~ 40 C |



Cryostat system
For 2 inch wafer sample



For microscope

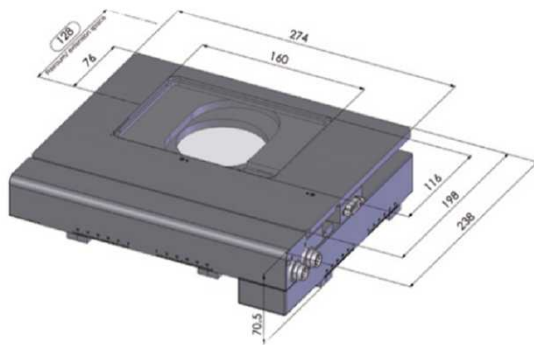


Cryostat head(~4k)

Scanning stage option

Parameter

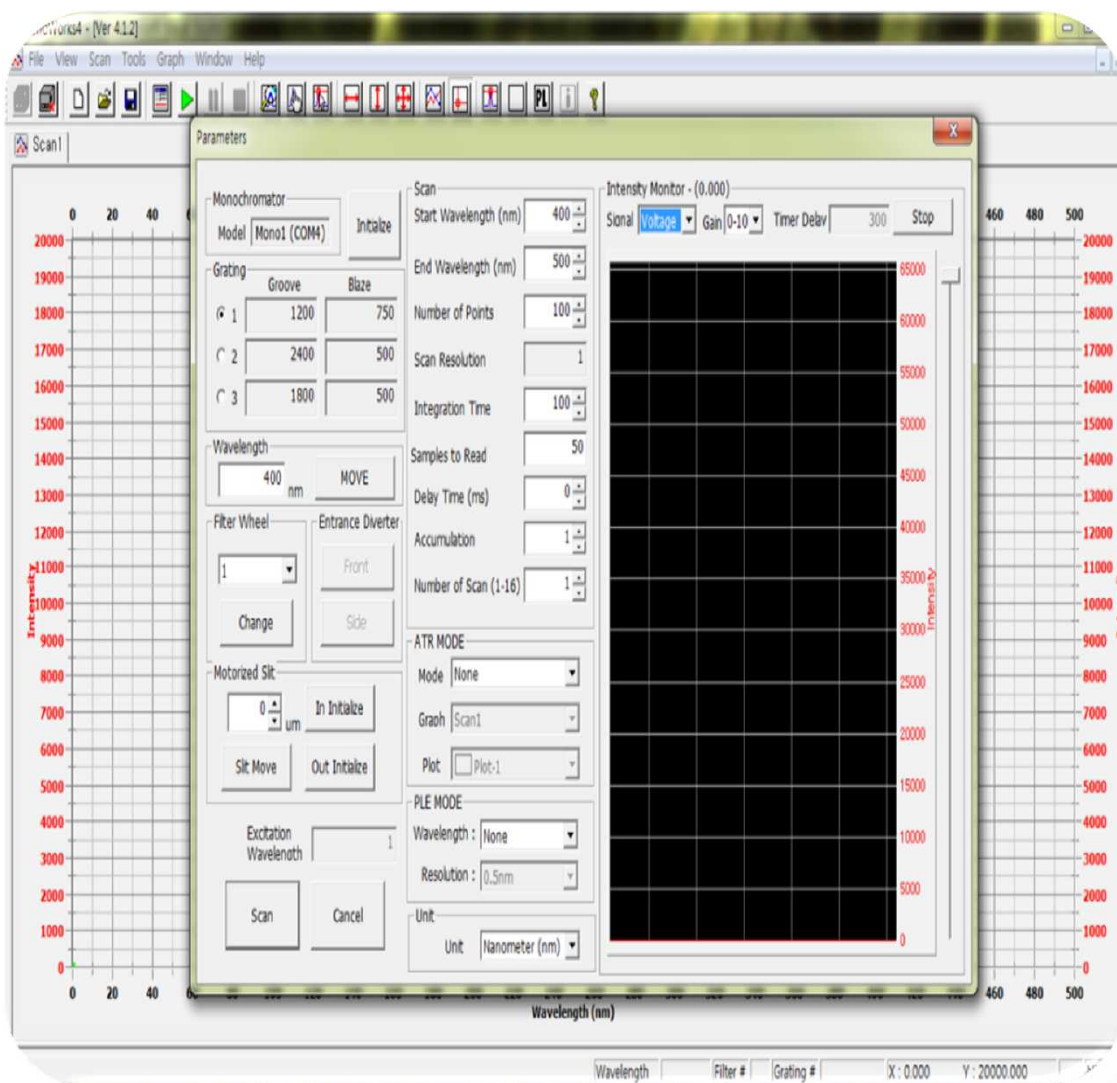
| | |
|-------------------|--|
| Application | Transmitted and reflected light , upright microscope |
| Travel range | 76x52 mm |
| Repeatability | <1 um(bi-directional) |
| Accuracy | 1 um |
| Resolution | 0.05 um(smallest step size) |
| Orthogonality | <10 arc sec |
| Motor | 2 phase stepper motor |
| Max. travel speed | 120mm/s |
| Limit switch | Optical light beam |
| Material | Aluminium |
| Surface | Anodic coating, black laquered |
| Dimension | 232x226x23(thickness) mm |
| Warranty | 5year |



High precision Microscope scanning stage

Software ; Monoworks operating program

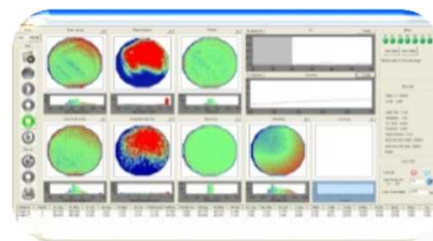
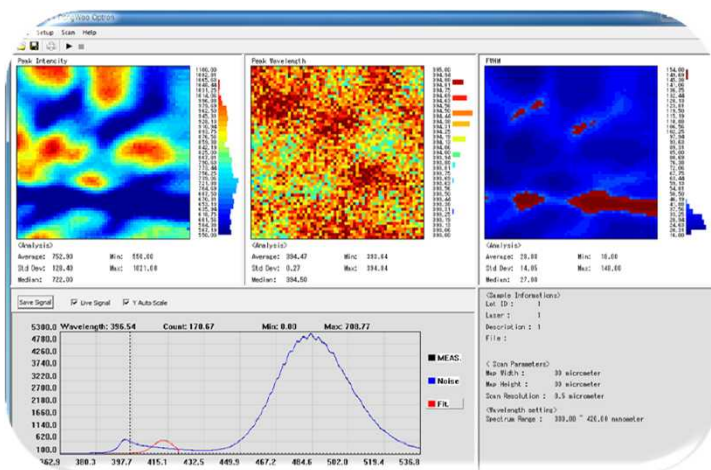
- Single / Double monochromator control(optional) by user selection
- Easy parameter selection & zoom in/out
- Select monochromator, serial port , turret, grating & current wavelength information
- Set the wavelength range of scan
- Set the resolution &integrating time (msec)
- Set the accumulation
- Peak finder
- Unit : Wavelength, eV, cm-1
- Semi-Auto calibration



Main window for setting

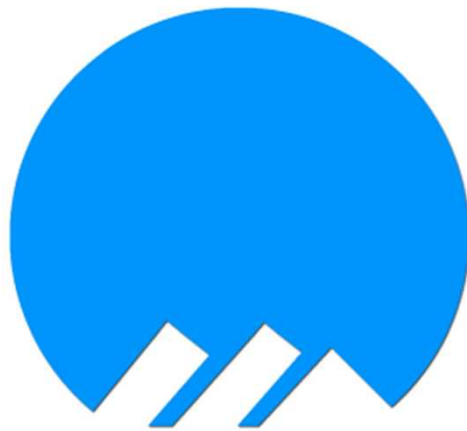
Software ; Maple – scan image & spectroscopy

- Spectral mode
 - Set the wavelength range, number of Point/resolution
Integration time(msec), Accumulation etc.
- Real time measurement and spectrum displayed in parallel
 - Wavelength/Wavenumber(Photoluminescence / Raman), Intensity, FWHM,
- Sample area Double peak isolation(Focused on shoulder peak or exclude area)
- User defined threshold, Max and Min Values
- Set Step resolution and scanning area
- Automation
 - High speed/High precision XYZ stage control (below 0.1 um)
 - Laser focus calibration : Intelligent auto Z-axis stage calibrates the laser beam focus(optional)
 - Select proper grating , ent/exit slit of monochromator control , beam diverting mirror control,
 - Laser beam block to prevent harmful scattering,
 - Motorized filter wheel control according to the input laser line(reject laser and pass signal to Detector)
 - Motorized ND filter in front of laser to control the laser power on sample surface
 - Sample and laser beam spot capture for alignment



- Maple, operating software window for research

- Maple-I, operating software window for high Speed mapping system for Industry



Partner for Spectroscopy

Leading spectroscopy company Since 1989
DongWoo Optron Co., Ltd.
102-8, Hoean-Daero, Opo-Eup, Gwangju-Si,
Gyunggi-Do, South Korea, 464-893
Tel: +82 (0)31-765-0300 Dir. +82 (0)70-4673-4705
Fax: +82 (0)31-765-0222
E-mail : dos@optron.co.kr
<http://www.dwoptron.com>

DongWoo is the company creating new wavelength

DongWoo Optron Co., Ltd.