Variable Solar Intensity and Wavelength Solar Simulator

SM-X12

The **SM-X12** is a **high-precision solar simulator** capable of generating **variable light intensities** and **multiple wavelengths**. It automatically measures **current-voltage (I–V)** and **photoresponse characteristics** of **photodiodes, photosensors, and photodetectors** under controlled illumination conditions, providing **fully automated, computer-controlled testing**.

The **Variable Intensity and Multi-Wavelength Solar Simulator** is a high-precision platform designed for **automated characterization of photodiodes, photosensors, and photodetectors**. The system measures **current-voltage (I–V) characteristics** and **photoresponse (I–λ) characteristics** under **variable solar light intensities** and **multiple wavelengths**, providing a complete laboratory-grade testing environment.

Key Features

System includes
AAA solar simulator
Easy Light Adjustment controller
Sourcemeter
Photoconductivity Characterization system
Sertificated reference cell
Sample holder
Software

Automatic Characterization System

Automated Measurements

Under Variable Light Intensities

- Automatic **I–V (Current-Voltage) measurements**
- Automatic **Power–V (P–V) measurements**
- Automatic **ln(I)–V (log-scale current-voltage) measurements**
- Automatic **Short-circuit current vs. intensity (Isc–Intensity) measurements**
- Automatic **Photovoltaic mechanism analysis**

Under Variable Wavelengths

- Automatic **I–V measurements**
- Automatic **Power–V measurements**
- Automatic **ln(I)–V (log-scale) measurements**
- Automatic **Isc–Intensity measurements**
- Automatic **Photocurrent and photoresponse analysis**

System Features

- **Adjustable light intensity** to simulate real-world solar conditions
- **Fully computer-controlled operation** for precision and repeatability
- Compatible with **photodiodes, photosensors, and photodetectors**
- Automated, high-throughput characterization for research and R&D laboratories

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Software Modules

1. **Solar Manager Software**
    - Controls the solar simulator and light intensity
    - Automates measurement sequences for multiple devices
    - Data acquisition, visualization, and export
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2. **Photocurrent Software**

- Measures and analyzes photocurrent response under different wavelengths
- Real-time plotting of **I–λ curves**
- Real-time plotting of **I–t curves** unver various wavelengths
- Automated calculation of photoresponse parameters

Applications

- Research and development of photodiodes, phototransistors, and photosensors
- Characterization of optical and photovoltaic devices
- Calibration of photodetectors for laboratory and industrial use
- Multi-wavelength response analysis for sensor development

System Components

1. **AAA Class Solar Simulator** – Maintenance-free, high stability, factory-calibrated for AM1.5G spectral match according Class AAA for **IEC 60904-9**, **JIS C 8912**, and **ASTM E 927**
2. **Universal Solar Cell Compatibility:** DSSC, QDSC, OSC, Perovskite, Silicon, Thin-Film
3. **Irradiance Range:** 0.1 W/cm² to 1200 W/m²
4. **Illumination Area:** 2” x 2” at 1 Sun
5. **PV Cell Placement alignment:** Ensures precise alignment
6. **Adjustable Orientation:** Can be mounted pointing up, down, or sideways with 90° rotational accessory
7. **Standards Compliance:** Class AAA for **IEC 60904-9**, **JIS C 8912**, and **ASTM E 927**
8. **Easy Light Adjustment:** Fine-tune solar intensity with the controller
9. **Precision Sourcemeter** – Voltage range: **-7 V to +7 V**, Current range: **10 nA to 30 mA**
10. **Solar Light Controller** – Ensures precise and stable irradiance output

- **Wavelength range**: 370, 380, 390, 400, 410, 430, 450, 460, 520, 570, 610, 620, 690, 750, 760, 820, 860, 960, 980, 1050 nm

11. **Automatic IV Measurement Controller** – For programmable measurement sequences
12. **Calibrated Reference Solar Cell** – Factory calibrated for intensity and spectral match
13. **Sample Holder** – Adjustable for multiple orientations, including 0°–90° rotation
14. **Calibration:** Factory-calibrated reference solar cell for AM1.5G spectral match and irradiance intensity
15. **Electronic Pulse Module** Pulse Duration: 100 ms – 1 s
16. **LED-Based Monochromator** Wavelengths: 370 – 1010 nm (25 selectable wavelengths)
17. **Control System** Fully computer-controlled, automated measurement and analysis
18. **Software Modules** I–V SoftwarePhototransient-Time SoftwarePhotocurrent-Wavelength Software
19. **USB Communication:** Easy interface with control software

Software

The system includes multiple software modules for complete photovoltaic analysis:

- **Solar IV Characterization Software** – Automated I–V and P–V measurements
- **Solar Life-Time Software** – Long-term solar cell stability analysis
- **Transient Photocurrent Software** – Time-resolved photocurrent measurements (I-t)
- **Photovoltaic Mechanism Analysis Software** – Detailed analysis of PV mechanisms
- **Photoconductivity measurement system** Detailed analysis under wavelengths

Photoconductivity Characterization System

The **Photoconductivity Characterization System** is a **high-precision laboratory platform** for analyzing the **modulated current, voltage, and photoresponse characteristics** of **photodiodes, photosensors, and photodetectors** under controlled illumination and **various wavelengths**.

The system provides a **complete characterization environment**, including:

- Current-voltage (I–V) measurements under various wavelengths
- Photocurrent-wavelength (Iph–λ) analysis
- Power-voltage (P–V) curves various wavelengths
- Phototransient current-time analysis various wavelengths

All measurements are fully **computer-controlled**, automated, and configurable according to customer requirements.

Phototransient Measurements (I–t)

- Photocurrent-time measurements under various wavelengths
- Photoresponse-time measurements under various wavelengths
- Photodetectivity-time measurements under various wavelengths

Photocurrent-Wavelength (I–λ) Analysis

- Photocurrent-wavelength measurements

- Photoresponse-wavelength measurements
- Photodetectivity-wavelength measurements

Key Features

- Automated measurement of **I–V curves** under multiple wavelengths
- Automated **photocurrent–wavelength (Iph–λ)** characterization
- Supports **photodiodes, photosensors, and solar cells**
- **Extended wavelength coverage** from 370 nm to 1010 nm
- High-precision source meter and LED monochromator for reproducible measurements

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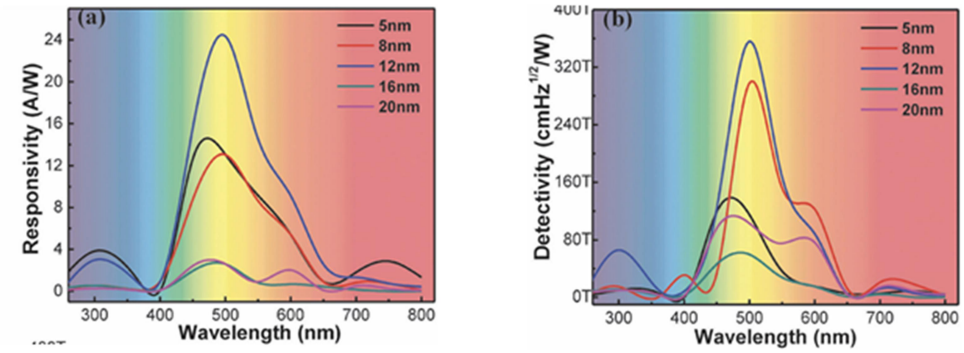
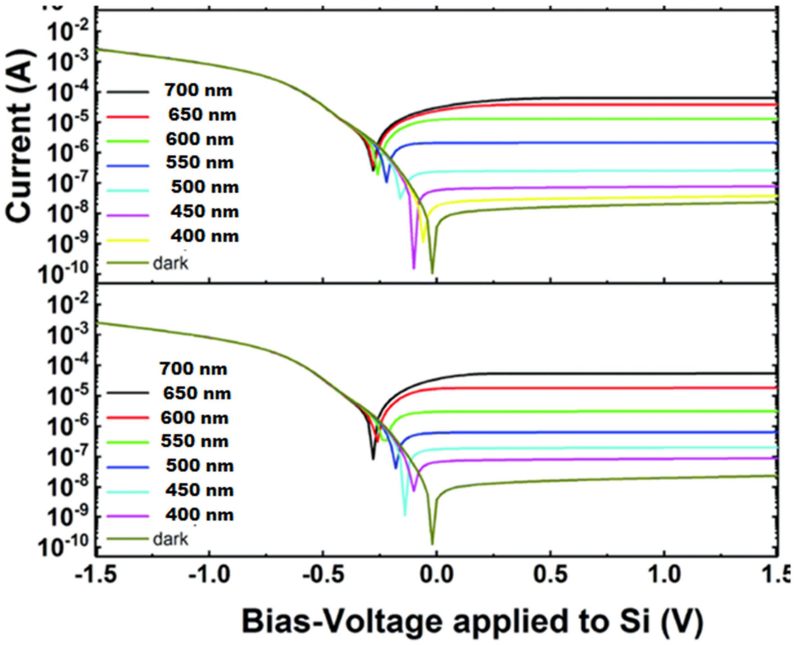
Applications

- Advanced **photodetector characterization**
- Photovoltaic device research (solar cells, photodiodes, sensors)
- Wavelength-dependent photoresponse studies
- Transient photocurrent and photoconductivity analysis
- Laboratory R&D and quality control




Current (A)
10-2
10-3
10-4
10-5
10-6
10-7
10-8
10-9
10-10
700 nm
650 nm
600 nm
550 nm
500 nm
450 nm
400 nm
dark
700 nm
650 nm
600 nm
550 nm
500 nm
450 nm
400 nm
dark
-1.5
-1.0
-0.5
0.0
0.5
1.0
Bias-Voltage applied to Si (V)