



Industrial Consultancy & Sponsored Research (IC&SR)

SYSTEM FOR OPTOELECTRONIC CHARACTERIZATION OF SOLID-STATE PHOTODETECTORS

IITM Technology Available for Licensing

PROBLEM STATEMENT

- **Precise Testing:** Photodetectors require precise testing conditions to avoid ambient light interference, which can affect performance assessments.
- **Conventional dark rooms** seal off devices from outside light, ensuring accurate measurements.
- The **need for a customized dark chamber** arises from the complexity and sensitivity of optoelectronic devices.
- **Present light sources** include solar simulators and high-cost LED-based sources.
- **Commercial setups are costly and sophisticated**, with applications including photovoltaic characterization, photodetector and phototransistor analysis, and more.
- **The invention aims to address the limitations of existing dark chambers** by introducing a novel design optimized for comprehensive testing of optoelectronic devices.

TECHNOLOGY CATEGORY/ MARKET

Technology: Optoelectronic characterisation of solid-state photodetectors

Category: Photonics/Assistive, Test Equipment & Design Manufacturing

Industry: Electronic System & Design Manufacturing (ESDM)

Application: Photodetector and phototransistor analysis, dark current analysis

Market: The global market size is expected to reach **USD 1.64 trillion in 2024** and grow at a **CAGR of 6.5%** to reach **USD 2.25 trillion by 2029**.

INTELLECTUAL PROPERTY

IITM IDF Ref. 2766,
Patent No: IN 548386

TRL (Technology Readiness Level)

TRL- 4, Experimentally validated in Lab;

Research Lab

Prof. Parasuraman Swaminathan,
Dept. of Metallurgical and Materials Engineering

TECHNOLOGY

1

The system consists of a dark chamber with a disc turret for holding multiple light sources, concentrator tubes, and collimators.

2

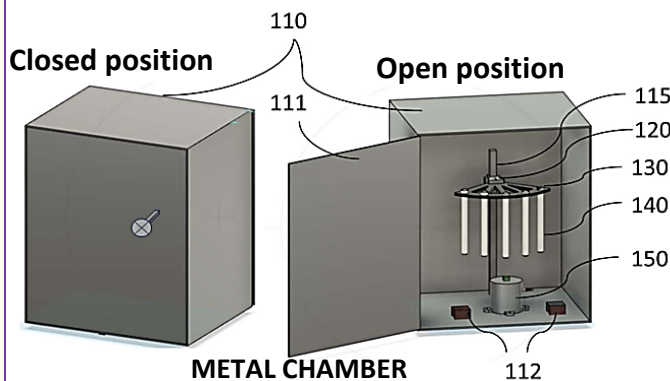
The analyzer is connected to a display device. Most components are developed using 3D printing with black filament to minimize light reflections within the chamber.

3

A sample holder with vacuum suction is placed inside the chamber, and two or more probes can be used to set contact with the parametric analyzer.

4

The turret can be rotated to position the light source.



Numerals	Definition
110	Dark chamber
111	open side
112	multiple probes
115	axial support
120	Y- fixture
130	disc turret
140	concentrator tubes
150	sample holder

CONTACT US

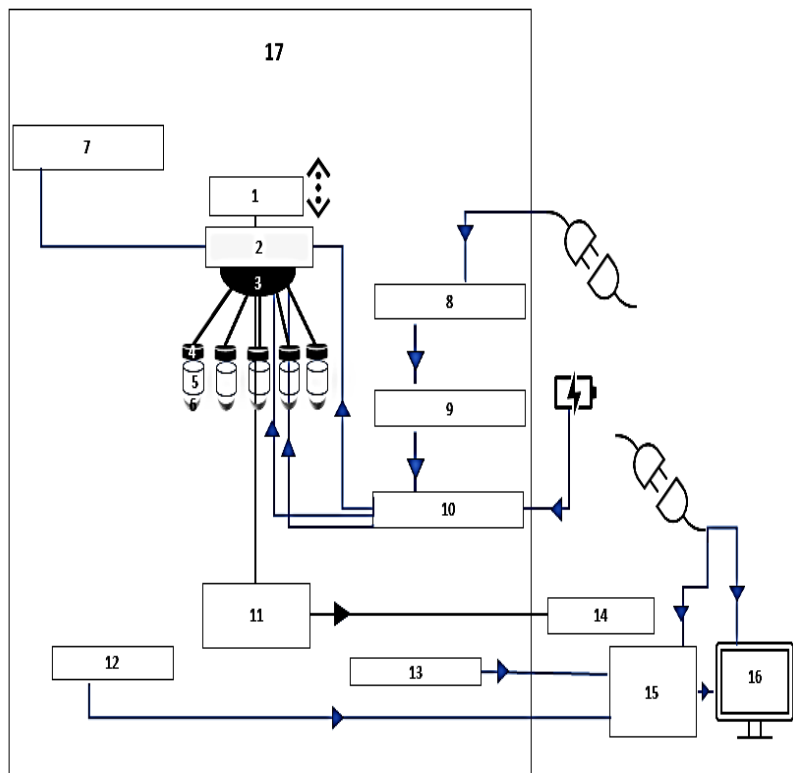
Dr. Dara Ajay, Head TTO
Technology Transfer Office,
IPM Cell- IC&SR, IIT Madras

IITM TTO Website:
<https://ipm.icsr.in/ipm/>

Email: headtto-icsr@icsrps.iitm.ac.in
tto-mktg@icsrps.iitm.ac.in

Phone: +91-44-2257 9756/ 9719

System and its components



Numerals	Definition
1	Axial support to hold the light system.
2	Clamp
3	Holder structure for light
4	Light source
5	Concentrator
6	Collimator
7	Luminous flux meter/ solar meter
8	Power source for LED
9	Perforated board
10	Microcontroller
11	Sample holder with vacuum
12	Probe station_1
13	Probe station 2
14	Vacuum pump
15	Parametric analyser
16	Display
17	Dark Chamber

Key Features / Value Proposition

Spectral Range for Illumination and Material Selection

- Utilizes UV, visible, or IR light sources for testing wavelengths.
- Features a multi-wavelength source holder for easy switching between light sources.

Material Selection and Coating

- Dark chamber material chosen for low-cost setup, ensuring structural integrity and minimizing interference.
- Internal coating done with light-absorbing non-reflecting black powder coating to minimize reflection and scattering.

Sample Position and Light-Tight Construction

- Dedicated sample holder with suction facility for sample holding.
- Light source motion in z-direction, confirmed using swivel lock and brackets.

Features of the Invention

- Follows QCQA for faster photodetector diagnosis.

Customized Probing Solutions

- Electrical probes attached to dark chamber for **easy contact with sample**.
- Two-probe and four-probe measurement setups available.

Intensity Checker

- **Solar meter attached** to dark chamber to measure light intensity.

Modularity and Adaptability

- **Easy adjustment** of light wavelength, total exposure duration, and intensity.

Ability

- **Cheap and adjustable** illumination system for precise control of light intensity.
- **Illumination source tailored to specific spectral range.**

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