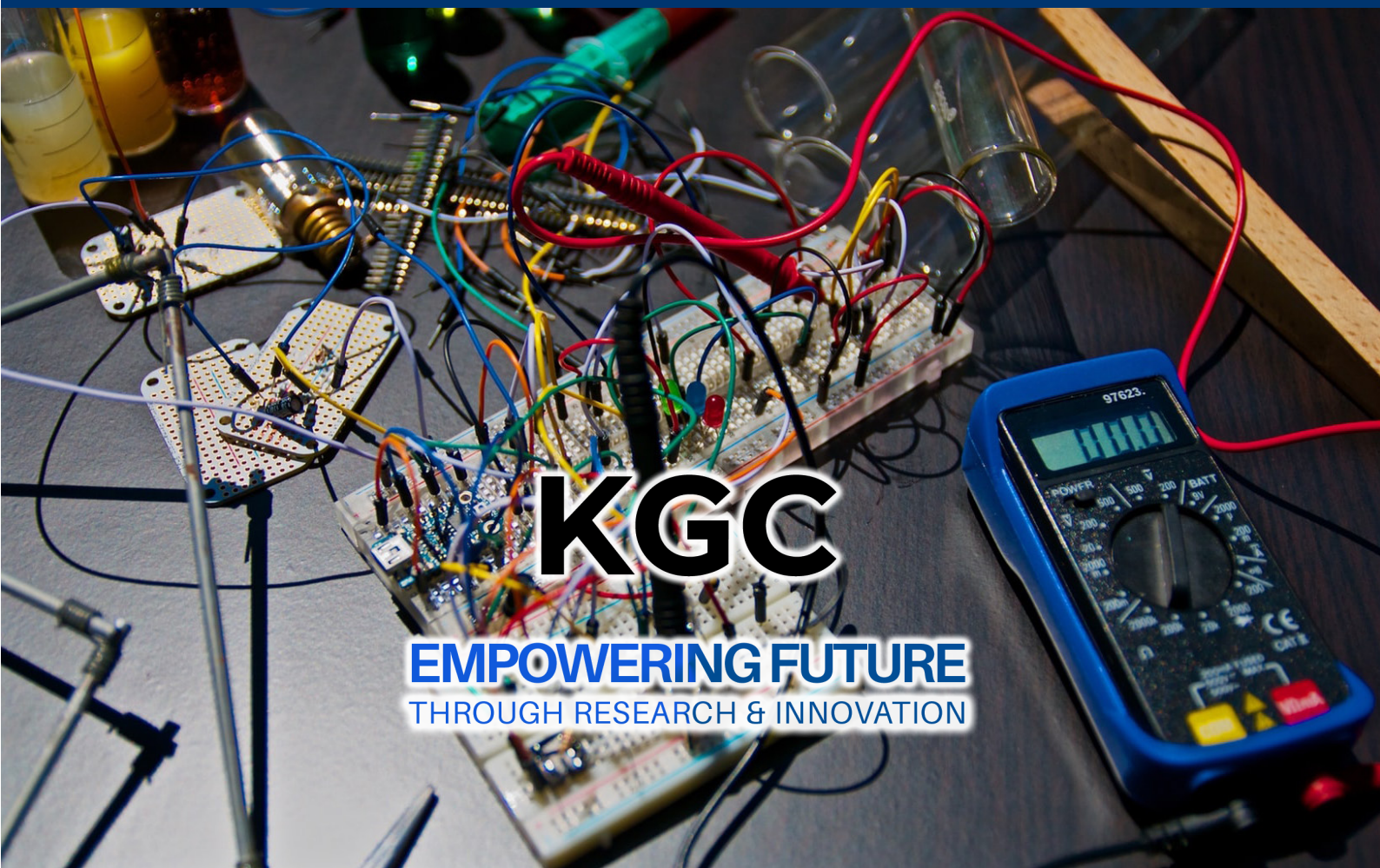
PHYSICS APPARATUS SETUP

Babysteps to advanced physics



INTRODUCTION

Welcome to our 2020 - 2021 edition of Product Catalog. We would like to thank you for your continue support and encouragement. Throughout this challenging time, we have grown and transform our business to be more efficient and effective. This will enable us to offer better service and more competitive pricing to our customers.

Our new edition of catalog comes with a easy reference features where we categorized the products into different usage categories, i.e. Advanced Material, Renewable Energy, Bio-Process, Gauge Calibration, Membrane Technology, 3D scanner and others. This will facilitate the users to quickly access to the equipment specification required, and options available to them in term of measuring range or equipment complexity.

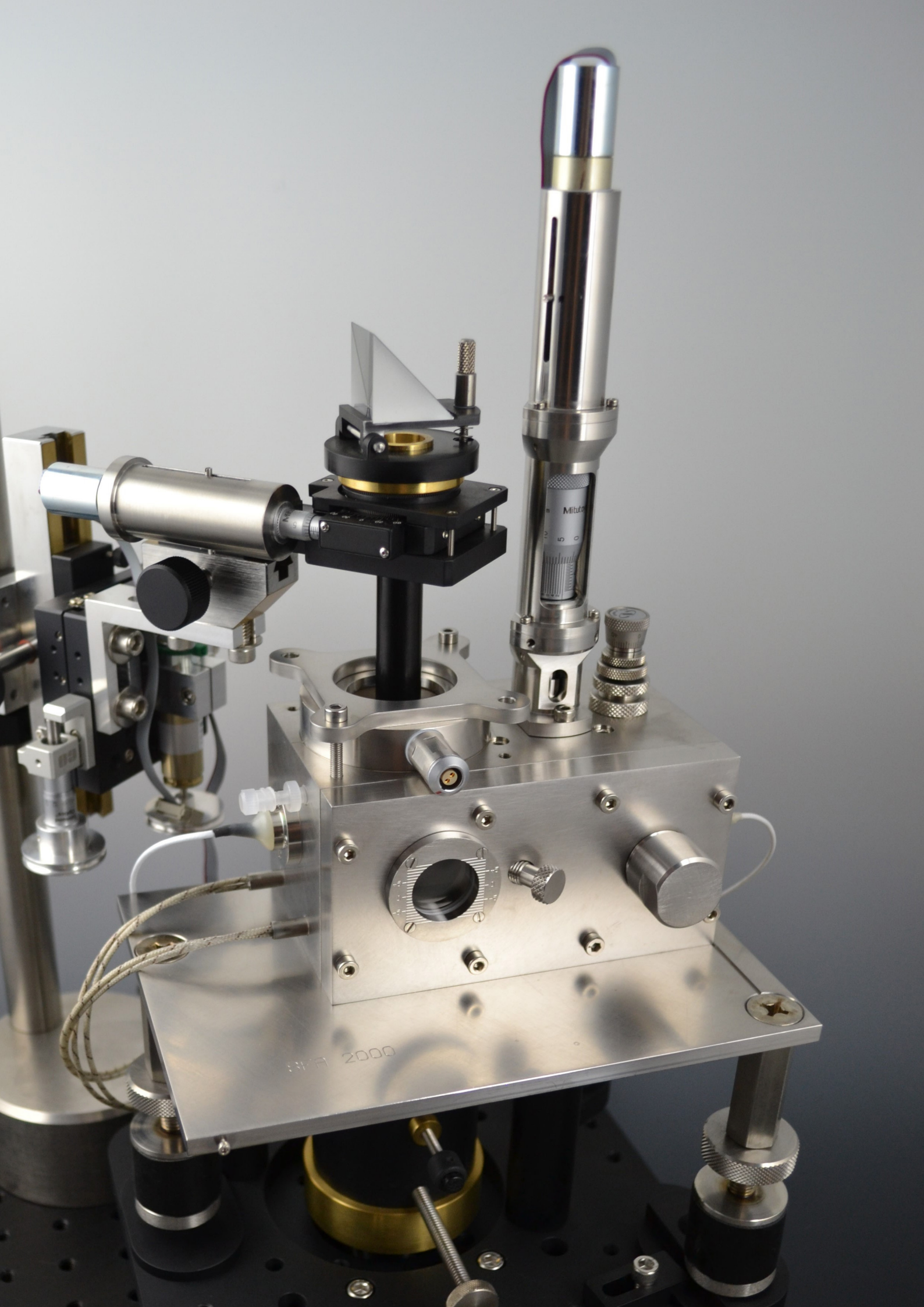
In our new catalog, we have also added the equipment to do research in renewable energy like solar cell, fuel cell, flow cell, lithium ion batteries, and membrane technologies. In synergy with our advanced material equipment, we have also added the equipment for material characterization especially in the area of rare earth research and magnetic properties. In line with the manufacturing industry footsteps, the equipment on 3D scanning and 3D printing also have been added in to expand the tools in the research and development for industry 4.0.

To our current customers, we believed our partnership will be strengthen for the years to come. The new catalog will also create new opportunities to build new relationship with new customers.

Lastly, I would like to thanks our staffs for their dedication and sacrifice in supporting the management for a brighter future.

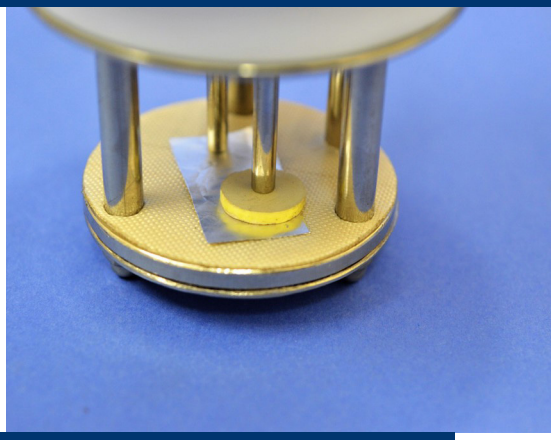
Patrick Tan
Director
KGC (Group of Companies)

Contents



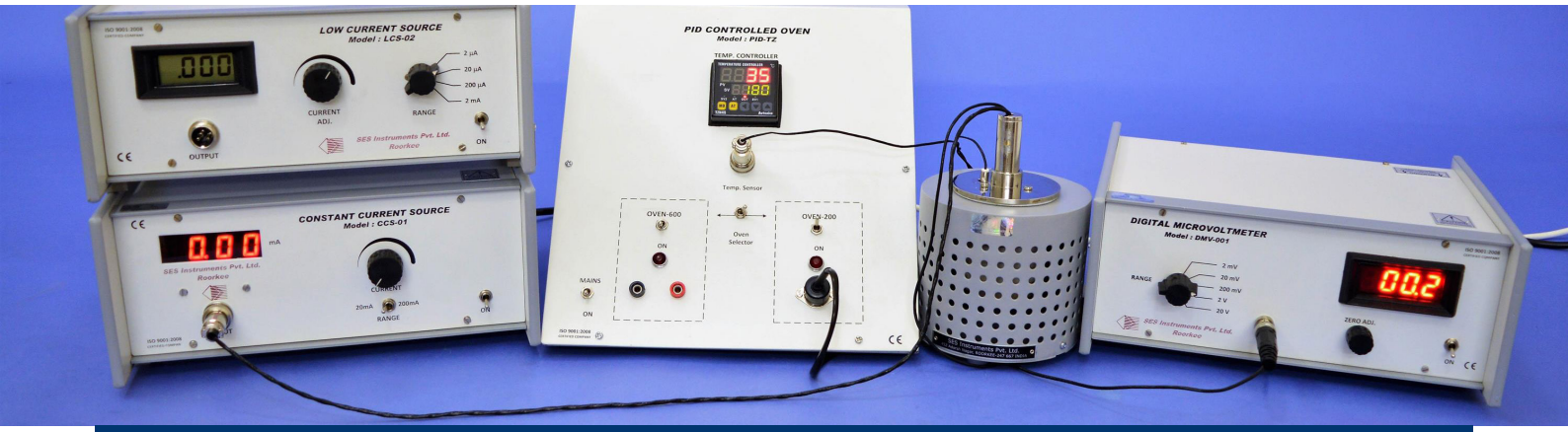
Physics Experimental Setup

SVSLabs Inc. based in Silicon Valley is founded and managed by technologists and scientists with deep experience in developing products for college labs and R&D. The products offered here are developed here in Silicon Valley and/or re-sold from very selected companies we partner with



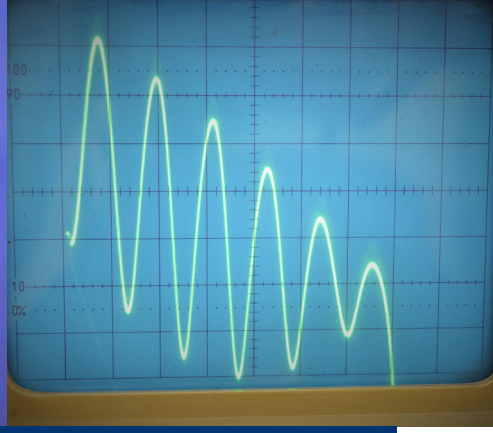
STUDY OF DIELECTRIC CONSTANT

- Demonstrate to the concept of Dielectric Constant, its measurement, measurement of Curie temperature
- Experimental set-up consist of:
- 1) Probes Arrangement
- 2) Sample : Barium Titanate (BaTiO3)
- 3) The oven has been designed for fast heating and cooling rates
- 4) Main Unit - The Set-up consists of two units housed in the same cabinet
- i) Oven Controller - Platinum RTD (A class) has been used for sensing the temperature
- ii) Digital Capacitance Meter -Reading Instrument for the measurement of capacitance of the sample



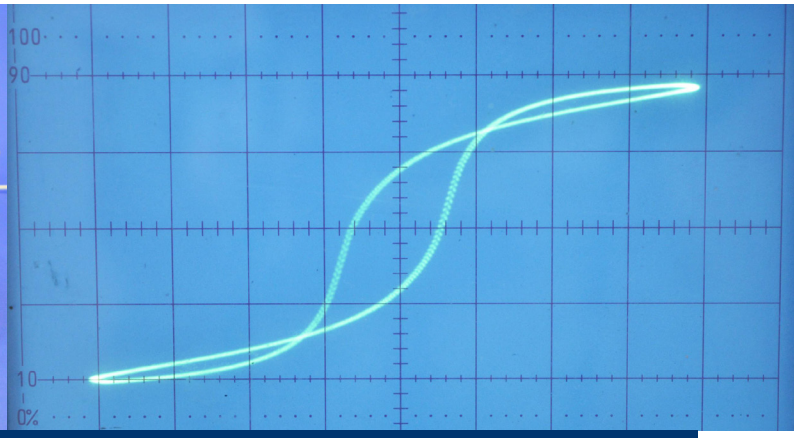
FOUR PROBE SET-UP

- The Four Probe Method is one of the standard and most widely used method for the measurement of resistivity. In its useful form, the four probes are collinear
- The error due to contact resistance, which is significant in the electrical measurement on semiconductors, is avoided by the use of two extra contacts (probes) between the current contacts
- The probes arrangement has four individually spring loaded probes which are collinear and equally spaced
- The unit has a high quality PID controller wherein the temperature can be set and controlled easily up to 200°C
- The constant current source is an IC regulated current generator to provide a constant current to the outer probes irrespective of the changing resistance of the sample due to change in temperatures
- Low current source is needed when the sample resistance is large

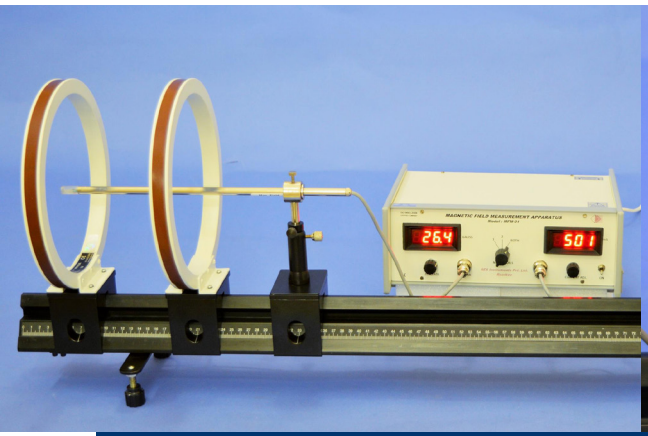
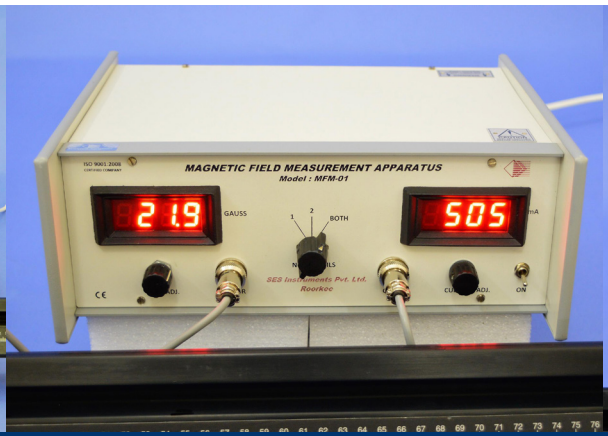
FRANK HERTZ EXPERIMENT

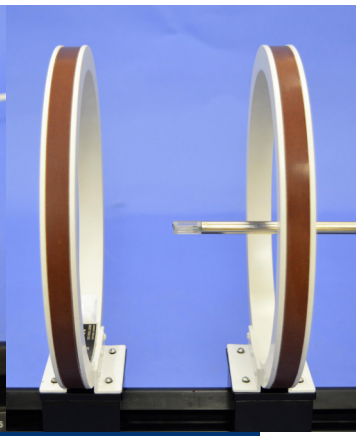
- Frank Hertz Experiment demonstrating the existence of excited states in atoms, helping to confirm the quantum theoretical concept that electrons occupied only discrete, quantized energy states
- This experiment verifies:
- 1) It is possible to excite atoms by low energy electron bombardment
- 2) The energy transferred from electrons to the atoms always had discrete values.
- 3) The values so obtained for the energy levels were in agreement with spectroscopic results.
- Experiment Set-up consists of Argon filled tetrode, Filament Power Supply : 2.6-3.4V, Power Supply for VG2A : 1.3 - 12V, Power Supply for VG2K : 0 - 95V, Saw tooth waveform, Scanning Voltage : 0-80V,Scanning Frequency : 115±20Hz,Range Multiplier : 10-7, 10-8, 10-9, Display : 31/2 digit 7 segment LED



MAGNETIC HYSTERESIS LOOP TRACER

- Magnetic Hysteresis study with CRO display, Coercivity, Saturation, Retentivity and Hysteresis loss., Complete setup except a CRO
- Measures magnetic parameters accurately
- Demagnetisation, eddy currents and sample cross-sectional area have been accounted for
- Capable of detecting the number of magnetic phase present in a sample
- The equipment is complete in all respect including a set of samples (wires of nickel and different grades of iron etc)



MAGNETIC FIELD MEASUREMENT APPARATUS

- Study of magnetic field of current carrying coil and determination of its radius.
- Study of superimposition of magnetic fields generated by two coils at different positions
- A study of magnetic field due to one coil and calculation of its diameter
- Apparatus consists of Digital Gausmeter , Two Coil and Constant Current Power Supply

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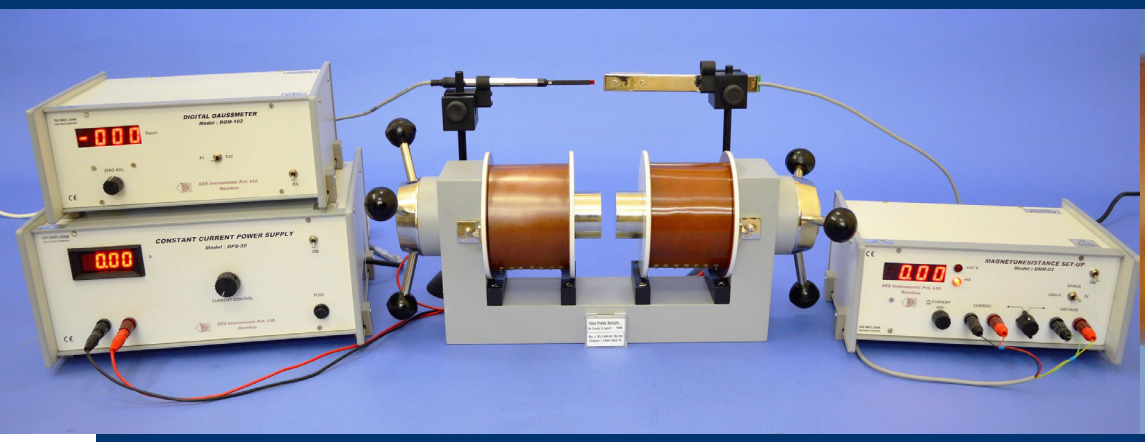
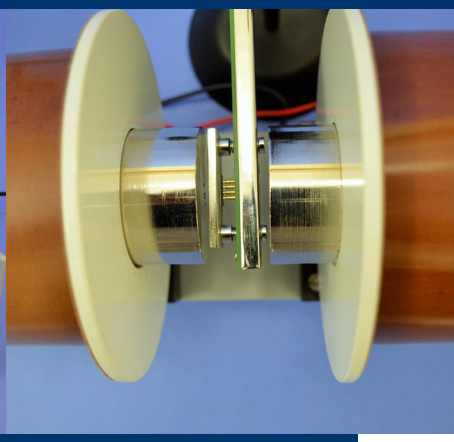


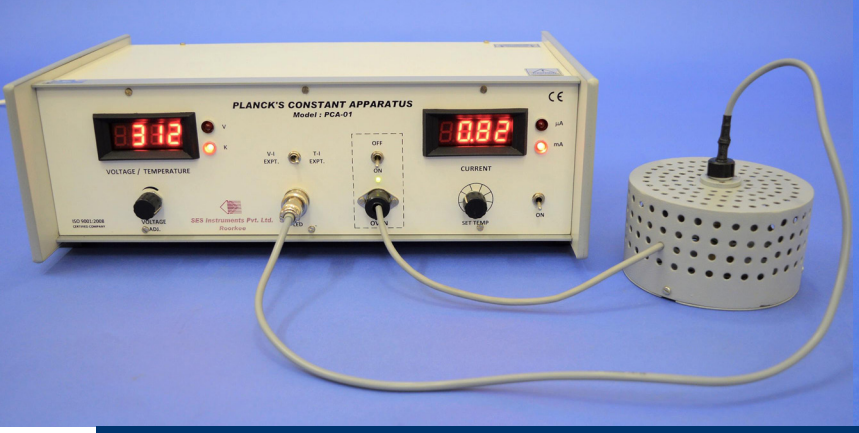


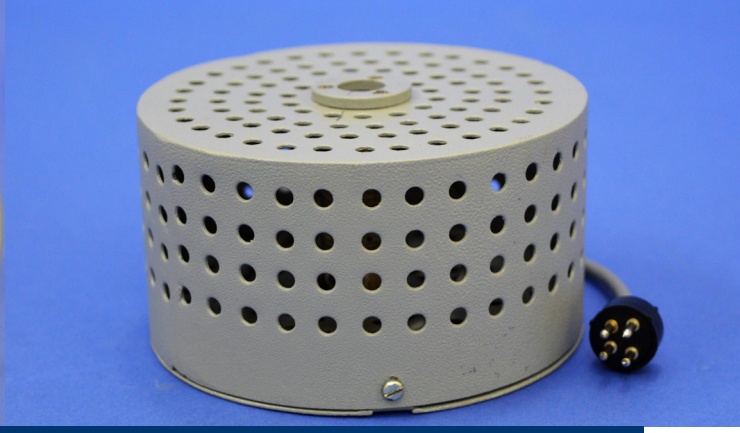
MEASUREMENT OF MAGNETORESISTANCE OF SEMICONDUCTORS

- 4 – Probe arrangement suitable for placing in a magnetic field. Magnetoresistance of Ge Sample. Complete with all accessoriesExperimental
- The set-up consists of the following:
- 1) Four probe arrangement - It consists of 4 collinear, equally spaced (2mm) and individually spring loaded probes mounted on a PCB strip.
- 2) Sample: (Ge: p-type)
- 3) Magnetoresistance set-up
- 4) Electromagnet, Model
- 5) Constant Current Power Supply
- 6) Digital Gaussmeter

PLANCK'S CONSTANT BY PHOTOELECTRIC EFFECT

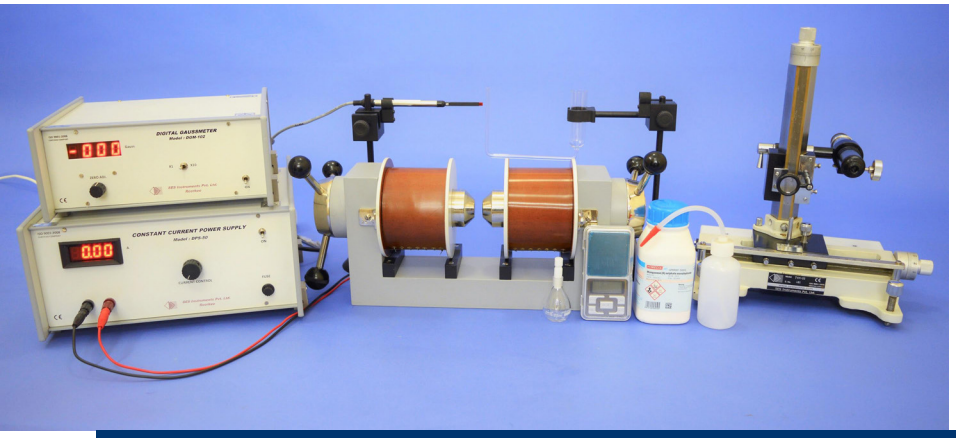
- Determination Of Planck's Constant And Work Function Of Materials By Photoelectric Effect.
- A simple experiment to display the splitting of spectral lines of an atom in the presence of a magnetic field caused by the distortion of the electron orbitals.
- This apparatus is to verify inverse square law of radiation using a photoelectric cell
- The apparatus consists of: Photo Sensitive Device, Light source, Colour Filters 635nm, 570nm, 540nm, 500nm & 460nm, Accelerating Voltage, Current Detecting Unit, Optical Bench and Power Requirement 220V +- 10%, 50H

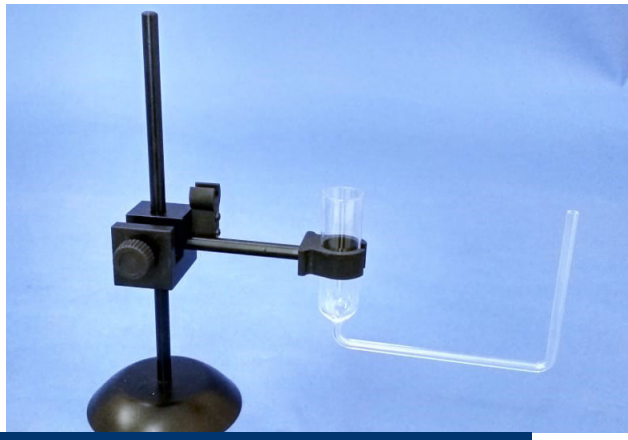




DETERMINATION OF PLANCK'S CONSTANT MEANS OF LED'S

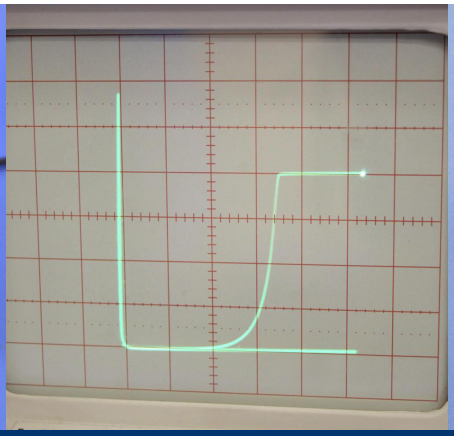
- The method is based on well-known expression of diode current for V < V 0.
- The dependence of current with temperature is measured, keeping the V slightly below V0 and material constant? is obtained from VI characteristics of the diode.
- Features:
- Highly accurate results
- Precise measurement of Band-Gap
- Clear physical interpretation
- Self-contained unit with no extra accessory required
- The following facilities are built in for this: Current Meter, Voltmeter and Oven

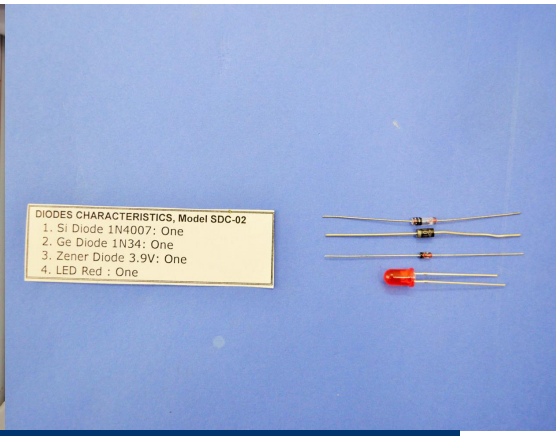




QUINCK'S TUBE METHOD

- Apparatus for the Measurement of Susceptibility of Paramagnetic Solution by Quinck's tube Method
- The apparatus consists of U-shaped tube known as Quinck's tube
- Easy maintenance
- Simple functioning
- Compact design
- The apparatus consists of the following: Quinck's tube with stand, Digital Balance 500gms, Electromagnet, Model: EMU-50T, Constant Current Power Supply,
- Model: DPS-50, Digital Gaussmeter, Model: DGM-102 and Travelling Microscope





STUDY OF DIODE CHARACTERISTICS

- Basic characteristics of diodes, Forward and Reverse characteristics of Ge, Si diodes and LEDs, Study of Zener diode characteristics, CRO display of forward and reverse characteristicsThe apparatus consists of U-shaped tube known as Quinck's tube
- The experimental set-up consists of following:
- 1) Diodes: Rectifier-4007 (Si), Signal diode-1N43 (Ge), Zener 4.7V and LED
- 2) 31/2 digit DPM which can measure diode voltage and current through op amp circuit. This provide near ideal measurements
- 3)Circuit to display forward/reverse characteristics of the diodes on a double trace CRO
- 4) IC regulated internal power supplies

Electricity & Magnetism

New products development is a continuing activity at Holmarc on a daily basis. We are introducing hundreds of new products every year which are either completely new or modified version of existing products

MAGNETO OPTIC SPECTROMETER (HO-A216FR/KRORMS)

- Fully Automated Optical Rotation / Thinfilm Test Station
- Provides standardized testing solution to fit wide ranging optical rotation measurement
- applications
- It designed for magneto optic material research and testing including magnetic characterizations of ferromagnetic and ferrimagnetic films and materials.
- Measurement include magnetic hysteresis loops of ultra thin magnetic films and multilayers, Ellipticity measurements, Thin film thickness measurement of dielectric materials, Refractive index, Delta and psi measurements etc.
- System can be operated in Polar, Longitudinal and Transverse configurations.

SPECTROSCOPIC MAGNETO – OPTIC ROTATION MEASUREMENT SYSTEM (HO-VIS214ORMS)

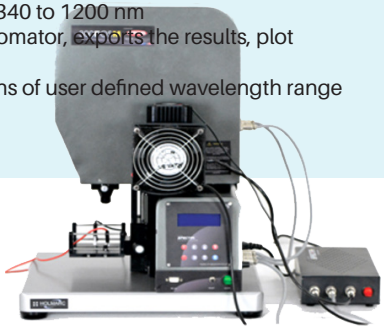
- It is designed for Faraday rotation angle measurements in the range of wavelength 85nm to 845nm
- Max. magnetic field of 15,000 Gauss can be generated at pole gap of 12mm
- Flexible and Adaptable Optical Layout
- 0.009 Degree Optical Rotation ResolutionMagnetic field detecting sensor
- Magnetic field feedback facility
- Light source: Spectra 20W Quartz halogen lamp
- Polarization analysis method: Rotation analyzing method
- Software to control the sample temperature and magnetic field

MILLIKAN'S OIL DROP APPARATUS (HO-ED-EM-01)

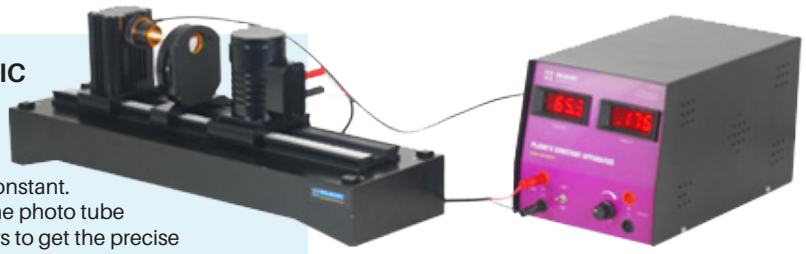
- Determine the charge of an electron by Millikan's Oil Drop Method
- High resolution camera delivers clear view of oil droplet
- Friendly software helps to monitor and measure the parameters of droplet movement
- Light can be controlled to illuminate the droplets inside the chamber
- Atomizer - to spray tiny oil droplets

SPECTRAL RESPONSE MEASUREMENT APPARATUS (HO-AE-SR18)

- For Photodetector & Solar cell samples Czerny
- Spectral response is the ratio of the current generated by the solar cell to the power incident on the solar cell or a detector.
- Measuring the spectral response of any kind of photovoltaic devices, such as single or multi junction solar cells or sensors in an area up to 30mm^2
- Wavelength range between 340 to 1200 nm
- Software to control monochromator, exports the results, plot spectral
- response and to perform scans of user defined wavelength range

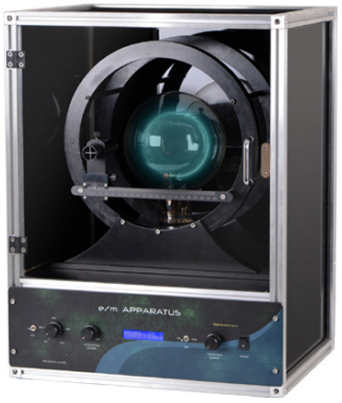


APPARATUS FOR THE STUDY OF PHOTO ELECTRIC EFFECT (HO-ED-EM-02)



- Study the Photo Electric Effect and to obtain the Planck's constant.
- Halogen source in the apparatus provides light energy to the photo tube
- The filter wheel includes five narrow band interference filters to get the precise
- wavelength
- The current amplifier is configured with high sensitivity and stability improve the
- accuracy of measurement
- The optical filters are of high quality in order to reduce the error while selecting
- the wavelength
- The photo tube has low levels of dark current and anode reverse current
- System can be operated in Polar, Longitudinal and Transverse configurations

E/M EXPERIMENT APPARATUS (HO-ED-EM-03)



- Design for the measurement of the charge to mass ratio e/m, of the electron.
- Demonstrate of effects of electric and magnetic fields on a moving charged
- particle
- Accelerating voltage : 0 - 250 V DC
- Coil current : 0.5 - 2.5 A, reversible
- Deflection plate voltage : 50-250 V, reversible
- The electrons are accelerated by the potential applied between the cathode and
- the anode

FRANCK HERTZ EXPERIMENT APPARATUS (HO-ED-EM-04)

- Designed for verifying the existence of quantized states.
- Direct display the amplitude spectrum curve on the oscilloscope screen
- Measure the excitation potential of Argon using the Franck - Hertz method
- Verify that atomic systems have discrete energy levels by bombarding electrons
- and observing the difference in energy levels
- Franck - Hertz Tube : Argon Filled Tetrod

APPARATUS FOR THE STUDY OF BIOT-SAVART'S LAW (HO-ED-EM-05)

- Designed for verifying the existence of quantized states.
- Direct display the amplitude spectrum curve on the oscilloscope screen
- Measure the excitation potential of Argon using the Franck - Hertz method
- Verify that atomic systems have discrete energy levels by bombarding electrons
- and observing the difference in energy levels
- Franck - Hertz Tube : Argon Filled Tetrod

Electricity & Magnetism

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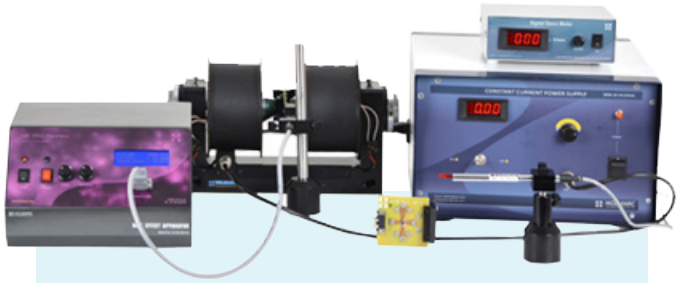
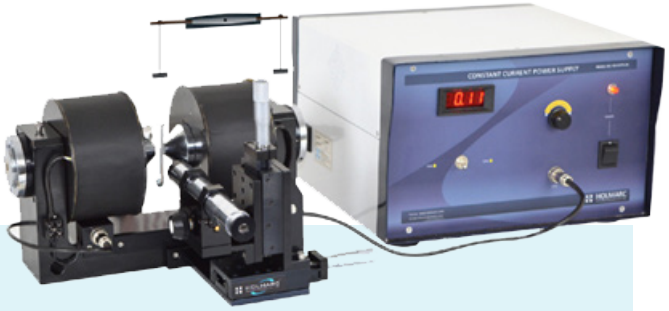


HALL EFFECT APPARATUS (HO-ED-EM-06)

- Measurement of Hall voltage as a function of Magnetic flux density, Sample temperature, Sample current
- Determination of density and mobility of charge carriers
- Determination of Hall coefficient of semi conductor crystals
- Hall Current : 0 - 10 mA
- Hall Voltage : 0 - 200 mV
- Crystal : n - type and p - type lightly doped Germanium (Ge)



MAGNETIC SUSCEPTIBILITY (HO-ED-EM-07)

- Quincke's Method
- Designed for the determination of magnetic susceptibility of a given solution
- Calibration of the magnetic field
- Measurement of magnetic susceptibility of paramagnetic Solutions
- Superior image quality of traveling microscope with precision micrometer drive
- Digital gauss meter gives direct reading of magnetic field in the 0 - 20 KG range

MAGNETIC SUSCEPTIBILITY (HO-ED-EM-08)

- Gouy's Method Apparatus
- Designed for the determination of magnetic susceptibility of solid samples
- Calibration of the magnetic field
- Measurement of Magnetic Susceptibility of paramagnetic solid samples
- The apparatus consists of a pair of electromagnets with constant current power supply and a tube in which the sample powder is taken.
- The magnetic field is measured using a digital Gauss meter.
- The sample weight measurements are taken with the help of a Gouy balance

HIGH SENSITIVITY LASER BASED MAGNETO-OPTICAL KERR EFFECT STATION (HO-MOKE LB215))

- The magneto-optical Kerr effect is a well-established technique to study magnetization properties.
- • Provides a convenient way to obtain the changes in magnetic moment at different fields and
- temperatures
- • Laser Wavelength : 405nm, 532nm, 650nm Diode Lasers
- • High Sensitivity
- • High Flexibility and Wide Range Magnetic Field
- • Easy to Operate

PHOTODETECTOR CHARACTERIZATION SETUP (HO-PDC-01)

- Wavelength range : 350 nm to 1600 nm
- Photocurrent measurement range: 0.1 nA to 1 A
- Bias voltage: +15V to -15V
- Bias voltage step size: 100 mV
- Monochromator type :Czerny Turner with two holographic
- gratings and 2nd order filters
- Monochromator is used to select a narrow wavelength band
- from a broad band quartz halogen lamp
- Light Source : 50 W tungsten halogen lamp

IV MEASUREMENT SYSTEM FOR SOLAR CELL (HO-SC-IV)

- Measurement of dark and lighted IV characteristics of a solar
- cell using a four quadrant power supply
- • 300 W Xenon Lamp with integrated power supply
- • 50mm beam diameter for lighted IV measurement
- • Sample holder with manual X-Y positioning arrangement to
- align the position of the light beam on the sample
- • Sample size up to 50 mm

QUANTUM EFFICIENCY & SPECTRAL RESPONSE MEASUREMENT SYSTEM (HO-SC-QE)

- Measurement of the spectral response and quantum efficiency of a solar cell from 400
- nm to 1200nm
- 300 W Xenon Lamp with integrated power supply
- 300 F Quasar Monochromator (400 - 1200 nm) with order sorting filters
- Sample holder with manual X-Y positioning arrangement to align the position of the light beam on the sample
- Sample size up to 50 mm
- Built-in optical chopper and lock in amplifier
- LED bias light

QUANTUM EFFICIENCY & IV MEASUREMENT SYSTEM (HO-SC-QEIV)

- Excellent for photovoltaic device characterization studies
- Essential for understanding current generation, recombination, and diffusion mechanisms in photovoltaic devices
- Measurement of the spectral response and quantum efficiency of a solar cell from 300 nm to 1600nm
- Measurement of dark and lighted IV characteristics of a solar cell using a four quadrant power supply
- 300 W Xenon Lamp with integrated power supply
- Sample holder with manual X-Y positioning system to align the position of the light beamon the sample
- Easy to use software with capability to measure dark and lighted IV characteristics of solar
- cell

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