Freiberg
Instruments

SPVmap

Surface Photo Voltage
high resolution mapping tool
Contactless electrical
characterization of
photoactive materials

for sophisticated material research & development

Ge, Si, InP, GaAs, SiC, GaN, Ga_2O_3, Diamond and 100s more

Features

Signal sensitivity
highest signal sensitivity for visualization of electro-optical processes in photoactive materials

Time resolution
10ns to 100ms

Material form factor
wafers, slabs, blanks, thin films, powder and nanoparticles

Measurement setup fixed wavelength
integration of up to four lasers in one measurement head for wide range injection level measurements or material specific customized measurements

Measurement setup wavelength scan
versatile measurement platform for advanced material research using broad wavelength light sources and double slit monochromators

Measurement speed
< 5 minutes for a 200 mm wafer, 1 mm resolution, one fixed wavelength or
< 60 minutes for a 200 mm wafer, 1 mm resolution, wavelength scan

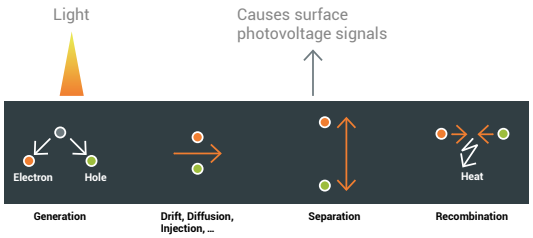
Spatial resolution
0.1 mm

Diameter measurement spot
0.5 mm
default setting

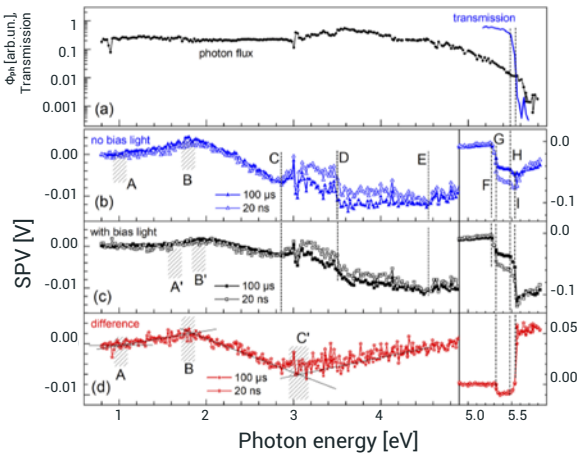
Reliability
modular and compact bench top instrument and monochromator configuration for high reliability and uptime > 99%

Repeatability of SPV measurement
< 2%

Fast and contact less investigation of charge separation processes, electronic transitions and diffusion lengths



Detection of photogenerated carries separated in space



Electronic transitions in synthetic diamond measured below the direct bandgap (< 5.56 eV). Negative (positive) SPV signals show a preferential separation of photogenerated electrons (holes) towards the surface

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SPVmap

Technical specifications

Sample size
5 × 5 mm² to 300 mm, square wafers, round wafers or arbitrary geometry, 10 µm to 25 mm thickness

Measurable properties
Surface Photovoltage, time-resolved and amplitude

Excitation fixed λ
select up to four different wavelengths from 260 nm up to 1480 nm; 980 nm is default

Excitation variable λ
Laser-driven light source (170 – 2500 nm) and Halogen lamps (200 – 2700 nm)

Laptop or PC requirements
Windows 10 or latest, .NET Framework update, 2 Ethernet ports

Materials
silicon, germanium, compound semiconductors, wide bandgap materials, perovskites, photocatalysts

Power requirements
100–250V AC, 5A

Dimensions
680 × 380 × 450mm
without monochromator

Weight
ca. 65kg
without monochromator

Certification
manufactured under ISO 9001 guidelines, CE conform

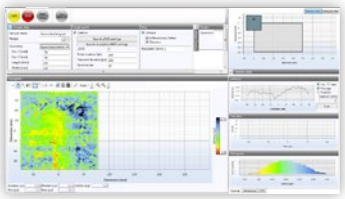
Configuration options

- → Spot size variation
- → Reference wafer
- → BiasSPV
- → Integrated heating stage
- → Wide range of lasers and light emitting diodes
- → Laser-driven light source and Halogen lamps

SPVstudio

User-friendly and advanced operating software with:

- → Time-resolved SPV signal output, SPV signal height, minority carrier lifetime
- → Export and import functions
- → Multi-level user account management
- → Overview over all performed measurements
- → Sample parameter input
- → Single point measurements e. g. injection dependent measurements
- → Raw data access
- → Mapping options
- → Recipes
- → Package of analysis functions; for instance, Transient Analytic Software - stretched exponential fit with up to 5 parameters
- → View of line scans and single transients



Remote accessibility
IP based system allows remote operation and technical support from anywhere in the world.

Relevant products

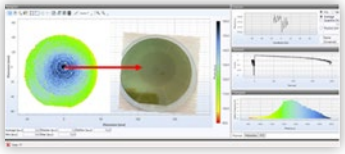
SPVmap
without monochromator

MDPmap

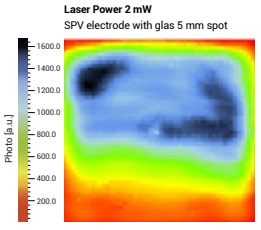
MDpicts

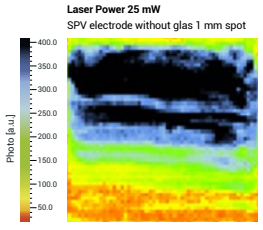
Sophisticated Material Research & Development

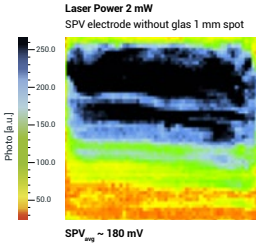
- → Bandgap engineering in Perovskites (example right)
- → Water splitting cells using photocatalytic materials
- → Surface & bulk contamination in semiconductor materials



- → SiC Epitaxial layer quality analysis







Visible of sample

Courtesy of
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Germany

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ZIM Zentrales Innovationsprogramm Mittelstand

HZB Helmholtz Zentrum Berlin