

ENVIRONMENTAL RESEARCH
STRENGTH TESTS
SURFACE TOPOGRAPHY STUDIES
OPTICAL MICROSCOPY AND FRACTION ANALYSIS
MECHANICAL TESTS
HIGH RESOLUTION MICROSCOPY
SAMPLE PREPARATION
SPECTROSCOPIC STUDIES AND CHEMICAL COMPOSITION



Research & Development Centre for Photovoltaics
PRICE LIST

Environmental chamber (large)/PV4500/ACS



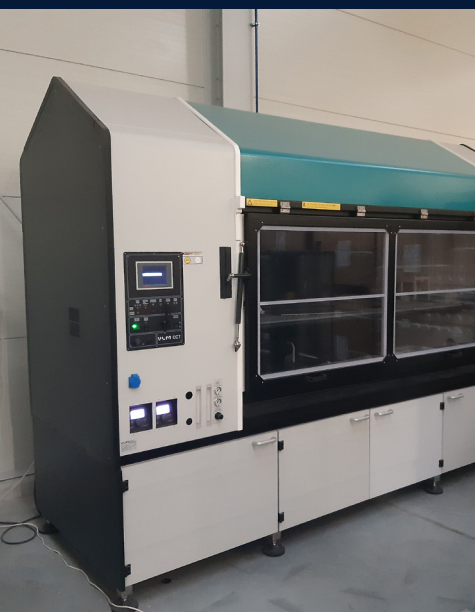
Temperature test	From 80 PLN/h	The price depends on: the type of sample – whether a sample can damage the chamber, type of test, operator's working time.
Humidity test	From 90 PLN/h	
UV test	From 90 PLN/h	The price includes only the study, without a specially prepared report.

Environmental chamber (small)/DM340C/ACS



Temperature test	From 45 PLN/h	The price depends on: the type of sample – whether a sample can destroy the chamber, type of test, operator' working time.
Humidity test	From 50 PLN/h	
UV test	From 50 PLN/h	The price includes only the study, without a specially prepared report.

Corrosion chamber/CCT 3600 FL AKES NH3



Tests using NH ₃	From 120 PLN/h	The price depends on: the type of sample – whether a sample can destroy the chamber, type of test, operator' working time, the corrosive agents used.
Moisture condensation tests Salt mist tests		
Cyclic tests (with the cold room air or air-conditioned warm air)		
TEST according to standard: PN-EN 61701:2012 – testing of photovoltaic modules (PV) in the corrosive environment of salt mist	From 8000 PLN/TEST	The price includes only the study, without a specially prepared report.

Hail impact test

PV module or other products resistance to hail impacts	From 90 PLN/h	The price includes only the study, without a specially prepared report.
TEST according to standard: PN EN 61215-2:2017-05 – photovoltaic (PV) modules for terrestrial applications. Test for 2 modules	From 5000 PLN/TEST	



Hard body impacts / pendulum test

Resistance of the PV module/glass to impact with a soft body – pendulum.		The price includes only the study, without a specially prepared report.
TEST according to standard: PN EN 61215-2:2017-05 – photovoltaic (PV) modules for terrestrial applications. Test for 2 modules	From 2000 PLN/TEST	
TEST according to standard: PN EN 12600:2004 – Glass in building. Pendulum test. Impact test method and classification for flat glass.	From 2000 PLN/TEST	



Soft body impacts

Resistance of the PV module to impact with a hard body – pendulum	From 2000 PLN/TEST	The price includes only the study, without a specially prepared report.
TEST according to standard: PN EN 61215-2:2017-05 – photovoltaic (PV) modules for terrestrial applications. Test for 2 modules		



Mechanical load test



Resistance of the PV module to wind

From 5000
PLN/TEST

The price includes only the study, without a specially prepared report.

TEST according to standard: PN EN 61215-2:2017-05 – photovoltaic (PV) modules for terrestrial applications. Test for 2 modules

Approval tests



Regulation Un/ECE No 43: Uniform provisions concerning the approval of safety glazing materials and their installation on vehicles

From 2000
PLN/ TEST

The price depends on the number of samples.

TEST: Glass control acc. to

UN/ECE Regulation No. 43:
1) Ball-impact test
2) Test of resistance to high temperature

The price includes a ready-made results interpretation sheet.

Test for 4 samples

Optical profilometer/Sensofar PLu Neox

Creation of
three-dimensional profiles

Surface morphology

Surface topography

Determination of layer
thickness

From 150
PLN/sample

The price includes only the study, without a
specially prepared report..



Stylus profilometer/Dektak XT/Bruker

Surface morphology

Determination of layer
thickness

From 120
PLN/sample

The price includes only the study, without a
specially prepared report.



Portable goniometer /PGX+/Rycobel

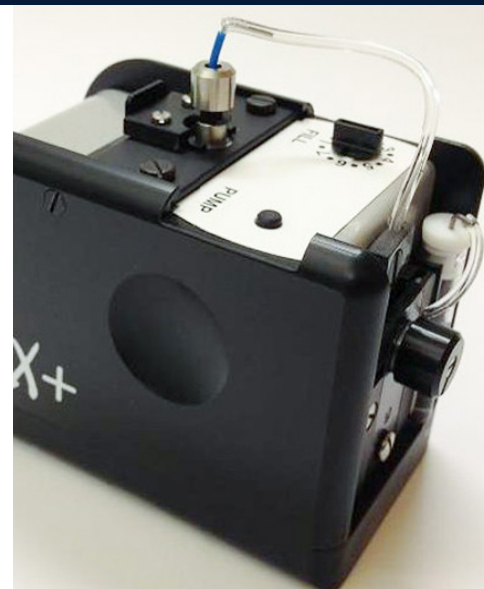
Static and dynamic contact
angle

From 50 PLN/
sample

The price includes only the study, without a
specially prepared report.

Determination of surface
energyj

From 100 PLN/
sample



Optical microscope/DMS 1000/Leica

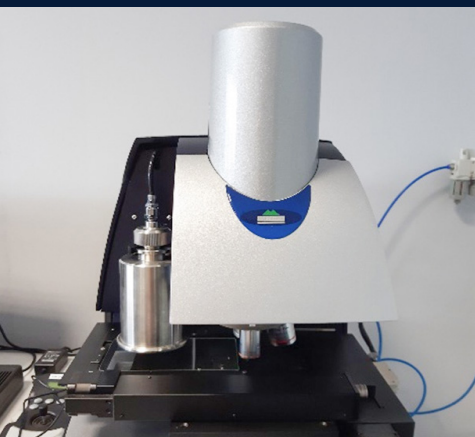


Observation
Measurements (2D)

From 50
PLN/h

The price includes only the study, without a specially prepared report.

Morphologi G3S/Malvern



Size and amount of particles determination in solution

From 50
PLN/h

The price includes only the study, without a specially prepared report.

Rotational Rheometers/Kinexus Pro/Malvern



Viscosity curves
Flow limit
Thixotropy

From 200
PLN /sample

The price includes only the study, without a specially prepared report.

Homogenizer Mixer/Speedmixer Mixmann DAC 400.1 FVZ



Mixing and grinding of materials

From 30 PLN/h

Up to 300 g loading.

MECHANICAL TESTS



Nanoindenter UNHT3/Scratch tester MCT3/Anton Paar

Hardness measurement
Young's modulus

Layer adhesion – scratch
test

From 230 PLN/
sample

The price includes only the study, without a
specially prepared report.



Hardness tester Vickersa/SHVS-500 SUNPOC

Material hardness test

From 50 PLN/
sample

The price includes only the study, without a
specially prepared report.



AFM/5500M/HITACHI (Atomic force microscopy)



Nano-scale Surface topography

Roughness

Measurement of lateral forces.

Kelvin Probe

Conductivity/resistance mapping of materials

from 400 PLN/h

The price includes only the study, without a specially prepared report.

The result is automatically generated and sent to the client electronically.

Analysis, interpretation of results and report – additional fee.

SSEM EDS/REGULUS 8230/HITACHI (Scanning electron microscopy with Energy dispersive spectroscopy)



Macro- and nanostructure imaging

from 200 PLN/h

The price includes only the study, without a specially prepared report.

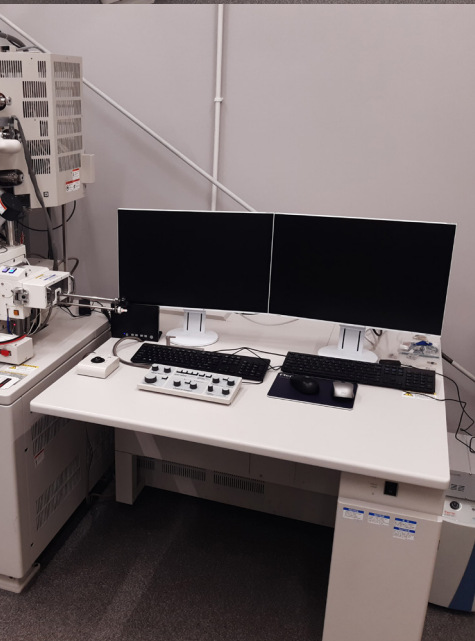
The result is automatically generated and sent to the client electronically.

SEM + EDS – the price is lower. EDS analysis from 150 PLN/sample.

EDS analysis

from 200 PLN /sample

Analysis, interpretation of results and report – additional fee.



SAMPLE PREPARATION



Turbomolecular pumped coater Q150 T

Applying a layer:
Au, Ag, Cr, Pt

From 20 PLN/
sample

Price depending on the target and the
layer thickness.



Ion Milling System/IM4000 Plus/Hitachi

Polishing and milling Ar⁺
ions Cross section

From 50 PLN/h

Price depends on the type of sample.



Zone SEM II

Ozone Cleaner – Cleaning
by UV – excited ozone

From 30 PLN/
sample

Price depends on the type of sample. .



Raman Spectrometer/LabRAM HR EVOLUTION/Horiba Scientific



Qualitative analysis

Quantitative analysis (with pattern availability)
(electronic amplifier allows you to measure ultra-weak signals)

From 250 PLN/h

The result is automatically generated and sent to the client electronically.

Analysis, interpretation of results and report – additional fee.

Spectrometr FTIR/Nicolet iS50/Thermo Scientific



Infrared spectra analysis

Qualitative analysis

Quantitative analysis (with standard available)

Qualitative analysis of the microstructure using a microscope

From 250 PLN/h

The result is automatically generated and sent to the client electronically.

Analysis, interpretation of results and report – additional fee.



Elipsometer/SEMILAB SE-2000

Determination of the layer thickness.
Optical properties
Refractive (n) and absorption (k) index
Porosity of materials
Optical properties as a functional of humidity and temperature

From 250 PLN/h

The result is automatically generated and sent to the client electronically.

Analysis, interpretation of results and report – additional fee.



GDS (Glow Discharge Spectrometer)

Quantitative analysis of the depth profile of various layers up to 1 cm

Qualitative and quantitative relative analysis

From 250 PLN/sample

The result is automatically generated and sent to the client electronically.

Analysis, interpretation of results and report – additional fee.



EDX (Energy-dispersive X-ray spectroscopy)

Element composition in solids

Element distribution map

Point analysis

Linear analysis


From 200 PLN/sample

The result is automatically generated and sent to the client electronically.


Analysis, interpretation of results and report – additional fee.




Quadrocopter DJI Matrice 210 + thermal-imaging cameras DJI Zenmuse XT2

	<p>Taking thermal images with a camera with a resolution of 640×512 pixels, temperature range from -40°C to 550 °C</p>	<p>From 1200 PLN</p>	<p>Raid on object with thermal imaging camera.</p>
		<p>From 2000 PLN</p>	<p>Raid on an object with a thermal imaging camera with a report.</p>

Laser Scanner Leica RTC360 3D

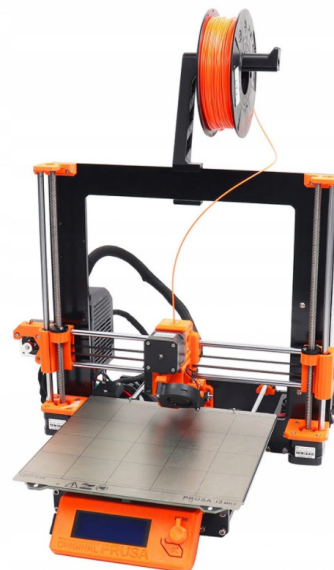
	<p>3D laser scanner for macro objects, used for measurements and inventory of: buildings, structures, terrain, etc.</p>	<p>From 2000 PLN</p>	<p>Cost of one day scan of an object/objects.</p>
		<p>From 1,45 PLN/m2 scanned area</p>	<p>Assembly and processing of point clouds, visualization and dimensioning of indicated objects.</p>

Sparklike Laser Portable

	<p>Non-invasive measurement of insulating gas in insulating Glass units (two or three chamber)</p>	<p>From 90 PLN/h</p>	<p>The minimum thickness of the operated glass ≥2 mm The maximum thickness of the operated glass ≥50 mm The price includes only the study, without a specially prepared report.</p>
		<p>2000 PLN/week</p>	<p>Rental equipment.</p>

3D Printer

FDM printing	From 50 PLN /h	<p>The price of the printout depends on the selected material and complexity of the printed model.</p> <p>Quotation of the 3D model performance after sending a technical drawing or detailed dimensions of the element. We have material such as: PLA, ABS, PET, ASA and others.</p> <p>The price of the project is set individually.</p>
Making 3D projects	From 200 PLN /project	



Report

Correlations between chemical/physical properties Analysis of research results, conclusions, graphs, etc.	From 200 PLN /report	Price depending on the amount of research, the length of the report.
English translation	From 200 PLN /report	

*The price depends on the type of sample, the measuring tools used, and the operator's working time. Determined individually for each order.

- The price are NET.
- The offer does not include the costs of materials for the manufacture of the subject of the order, the costs of sample preparation, assembly and disassembly in the laboratory.
- The costs of delivery, assembly and disassembly, and disposal of samples after the tests are covered by the Client.
- The final price and the date of implementation of research establishes R&D Director.



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