

Metrohm Hyphenated EC-Raman

Ready, set, easy hyphenation

PEOPLE YOU CAN TRUST



Metrohm Hyphenated EC-Raman for electrocatalysis

Combining electrochemistry with **Raman spectroscopy** provides detailed understanding of electrocatalysts in action.

Hyphenated EC-Raman synchronizes your electrochemical measurements with *in situ* Raman spectroscopy providing simultaneous structural and functional information about your catalysts: *operando* measurements allow for tracking changes of the structure, identifying adsorbed products or intermediates.

Metrohm offers **two packages** for electrocatalysis researchers which will get you **measuring quickly**: no complicated setups, complex training or worries about synchronizing measurements.

These solutions feature instrumentation from **Metrohm Autolab** and **B&W Tek** with the option to add a **customized cell** for your specific research requirements.



Metrohm EC-Raman Explorer Electrocatalysis Solution

The **Metrohm EC-Raman Explorer Electrocatalysis Solution** has an upgradable potentiostat/galvanostat that can change functionality as your research progresses.



B&W Tek i-Raman Plus 532H System features the unique combination of wide spectral coverage and high resolution.

- With a 532 nm laser for higher Raman scattering efficiency and the possibility to enhance the signal (Surface-Enhanced Raman Spectroscopy, SERS)
- Small, lightweight Raman system with fiber-optic sample probe for versatile measurement of different sample types

 B&W Tek Raman Video Microsampling System (532 nm) can accommodate a variety of cell sizes up to 30 mm high.

- A video camera provides real-time sample observation and coaxial LED illuminator for precise laser alignment.
- Two objectives for macro and micro perspective (20x & 50x).

Includes the **Autolab Trigger cable** that synchronizes and controls spectra acquisition through the NOVA software.



- Autolab modular **PGSTAT302N** with an **Electrochemical Impedance Spectroscopy** (EIS) module included.

- A powerful modular potentiostat/galvanostat with current ranges from 10 nA to 1 A.
- Future-proof your research with the ability to add up to
 7 additional modules post-installation (bipotentiostat, low current amplifier, true linear scan generator)

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Metrohm EC-Raman Starter Electrocatalysis Solution

The Metrohm EC-Raman Starter Electrocatalysis Solution comes with an Autolab PGSTAT204 with EIS that allows you to create the **right experimental conditions** almost anywhere with this portable, compact solution.

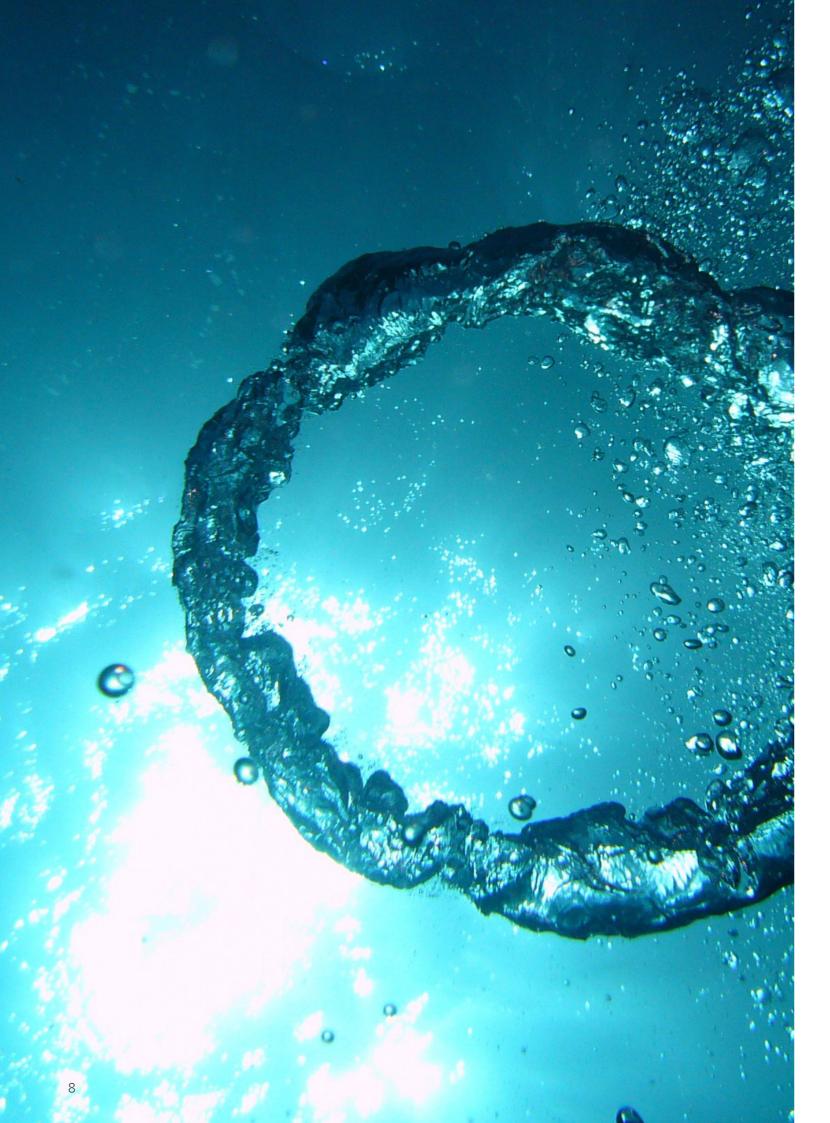
Includes the **Autolab Trigger cable** that synchronizes and controls spectra acquisition through the NOVA software.

DO YOU ALSO NEED A DEDICATED CELL?

For the Explorer or Starter Solution your local **Metrohm** sales representative can help you create a customized sample cell for your specific research requirements.



Spectroscopy (EIS) module for high accuracy impedance.



Ready-to-go when you are

HIGHLIGHTS

- Electrochemical workstation with **high accuracy EIS** included.
- Two editable **hyphenated Raman procedures** for the NOVA software, as well as the BWSpec software for extended **data analysis**.
- Ready-to-go solution that is simple to use.

TECHNIQUES AND METHODS

- Electrochemical Impedance Spectroscopy (EIS) for monitoring adsorption processes
- Electrochemical **SERS** (surface enhanced Raman spectroscopy)
- Raman Microscopy

MATERIALS

- Organics: molecular catalysts, adsorbed molecules and intermediates
- Inorganic compounds: oxides, carbonaceous materials (graphene, nanotubes), transition metal disulfides

Extend your EC-Raman Explorer solution with electrocatalysisdedicated modules such as:

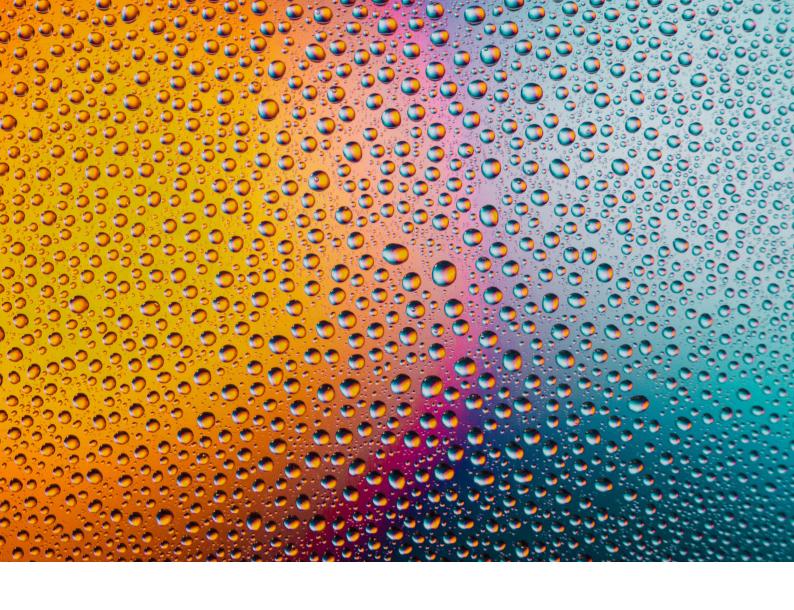
- **Bipotentiostat (BA)** module for additional Rotating Ring Disk Electrode (RRDE) measurements.
- True linear scan generator (SCAN250) module to observe fast adsorption processes with cyclic voltammetry.
- Low current amplifier (ECD) module providing two additional current ranges (1 nA and 100 pA) with a minimum current resolution of 0.3 fA.

SPECIFICATIONS

PGSTAT302N with EIS	module	
Potential range		± 10 V
Compliance voltage		± 30V
Maximum current		± 2 A
Current ranges		10 nA to 1 A
Bandwidth		1 MHz
EIS frequency range		10 μHz - 1 MHz
PGSTAT204 with EIS m	nodule	
Potential range		± 10 V
Compliance voltage		± 20V
Maximum current		± 400 mA
Current ranges		10 nA to 100 mA
Bandwidth		1 MHz
EIS frequency range		10 μHz - 1 MHz
i-Raman Plus 532H		
Laser	Wavelength	532 nm excitation
	Power	30 mW nominal (at exiting probe)
	Power Control	0 to 100% (adjustable at 1% increments)
Detector	Туре	High quantum efficiency CCD Array cooled to -2 °C
	Integration Time	100 ms - 30 mins
Spectrometer	Range	65 – 3400 cm ⁻¹
	Resolution	< 3.5 cm ⁻¹ @ 614 nm
PAC1E1 Paman Vidas	Microsampling System - 20x	r objective included
Travel in Z direction	inicrosampling system - 20x	24 mm
XY Stage		Double Layer Mechanical Stage
XY Stage Size		150mm x 140mm
Travel in X/Y direction		75 mm (X), 50 mm (Y)
- Haverinizo F direction		, 3 (, , , 3 8 (.)
Video Microscope Obj	ective, 20x	
Working distance		12.0 mm
Numerical aperture (NA)		0.4
Video Microscope Obj	ective, 50x (RML150A)	
Working distance		9.15 mm
Numerical aperture (NA)		0.55







ORDERING INFORMATION

Instruments and Accessories		
AUT302N.S	PGSTAT302N	
AUT204.S	PGSTAT204	
FRA32M.MAC.204.S	Electrochemical Impedance Spectroscopy (EIS) module	
BWT-840000360	i-Raman Plus 532H	
BWT-840000962	BAC151, Raman Video Microsampling System - 20x objective included	
BWT-840000325	Video Microscope Objective - 50x (RML 150A)	
BWT-840000395	BAC150B, Raman Probe Holder	
3500003120	Trigger cable for PGSTAT302N Hyphenated EC-Raman Solutions	
3500003130	Trigger cable for PGSTAT204 Hyphenated EC-Raman Solutions	