Precision Meets Simplicity

In-Situ Microelectrochemical Raman Spectrometer

VL-RM-EC-785

One Platform Many Possibilities

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This product is a research-grade combined equipment integrating **electrochemical testing and Raman spectroscopy analysis**, consisting of a Raman spectrometer, potentiostat, and microscopic system. Without damaging the sample, it can real-time and in-situ capture the molecular structure, phase change, and key intermediate information on the electrode surface during electrochemical reactions. It provides direct molecular-level evidence for mechanism research in fields such as electrocatalysis, battery materials, and CO reduction, and is widely used in cutting-edge materials and electrochemical research in research institutes and university laboratories.

Features

- In-situ chemical Raman spectroscopy analysis, non-destructive testing.
- High spatial resolution, suitable for materials science, biomedicine, environmental monitoring, etc.
- Flexible and portable, with scientific research-level precision, supporting multi-wavelength measurement.
- Integrated electrochemical testing and Raman spectroscopy analysis for real-time monitoring of chemical changes.
- Equipped with a high-stability laser and a constant-temperature refrigerated detector to ensure high-quality spectral collection.
- Comprehensive software functions, including automatic exposure, noise reduction algorithm, peak identification and area calculation.
- Customizable design to meet different scientific research needs.

Specification Parameters

Raman module	
model	VL-RM-EC-785
size	325×220×99 mm
weight	4.4 kg
spectral coverage	200-3000 cm^{-1}
spectral resolution	~8cm^{-1}@ 25μm Slit
The Raman frequency shift shows the value error	≤1 cm^{-1}
The Raman frequency-shift repeatability	≤1 cm^{-1}
excitation wavelength	785 ± 0.5 nm, Linewidth ≤ 0.08nm
laser power	0-500 mW adjustable
laser power stability	≤3% P-P (@ 2hrs)
laser life	10000 hrs
integration time	8 ms-30 min
dark noise	<3 RMS

CCD dynamic range	22000：1
supply voltage	5V/4 A
filter laser cutoff depth	OD8
working temperature	0-40℃
noise-signal ratio	1000
cryogenic temperature	-25℃
Probe	
high coupling efficiency	≥80%
working temperature	Probe main body: -20~80℃
front-end probe rod length	45 mm
bundle end armor	8.5 mm plastic-coated double-button metal tubing, 50N tensile strength N/A
working humidity	5%-80%
emission spectrum range	150-4000 cm^{-1}
Micromodule	
pixel	Nine million
transmission speed	3.9fps//3488X2616

VL-RM-EC-785 In-Situ Microelectrochemical Raman Spectrometer

Portable Research-Grade In-situ Spectral Analysis All-in-One System

2025 Ver1

pixel point size	1.67×1.67
adapter	0.5 X
objective	Infinite long working distance flat field achromatic gold phase objective lens 10,20,50
CCD imaging	Can be imaged
load table (without mapping)	Single-layer U-type mechanical object loading platform
changer	Internal positioning of the 5-well converter
falling lighting system	3W/10W LED lamp with adjustable brightness
focus structure	Coarse fine tuning coaxial, with finite position device and locking device, coarse moving stroke per turn: 30 mm, fine tuning hand wheel lattice value of 2 μm
Potentiostat	
potential control	±4.2 V
current-controlled	±10 mA
slot pressure	±10 V
reference electrode input	>1012 Ω

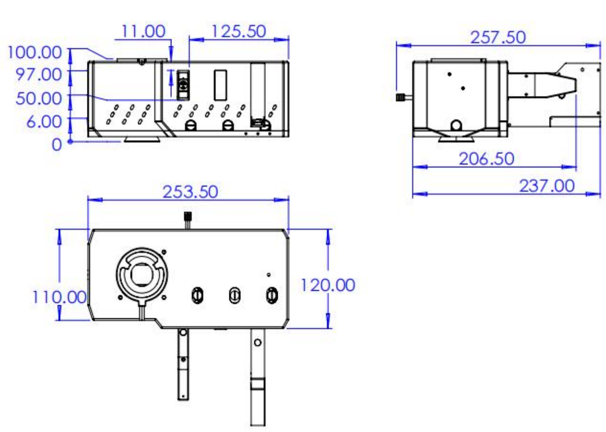
silver electrode (including electrode set)	2 mm diameter silver disc electrode
electrolytic cell	R=2.5 cm
Tractor parameter	
size	Raman module: 325×225×300 mm, microscopic module: 550×280×380 mm, complete machine size: 700×500×700 mm
working temperature	0-45℃
Working humidity	5-80%

impedance	
potential resolution	0.1 mV
current sensitivity	1 mA ~ 1 nA
potential acquisition	±5 V
current minimum resolution	1 pA
show	A 5-inch color touch screen
power adapter	Input: 100-240 VAC50HZ / 0.5 A, output: DC5V/2A
instrument power input	DC 5/2A, TYPE-C interface
equipped with special electrodes	Glass carbon electrode, gold electrode, silver electrode, saturated calomal reference electrode
Raman electrolysis pool	
quartz window piece	Φ 0.5 mm
platinum filament	Φ 0.5 mm
glass-carbon electrode (including electrode set)	Φ 0.3 mm glass carbon disk electrode
gold electrode (including electrode set)	2 mm diameter gold disk electrode

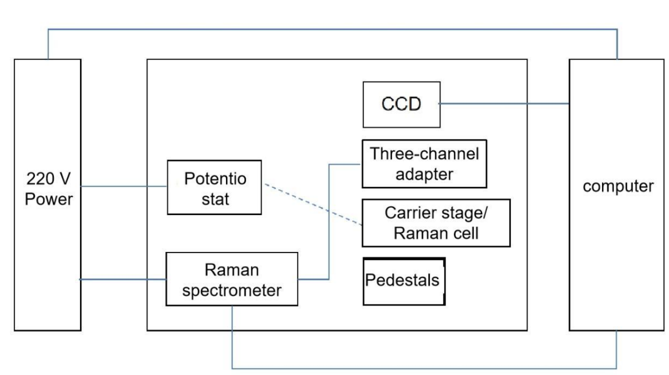
Accessories

Accessory Name	Category	Specification/Model	Quantity	Selection
Raman Spectrometer Host /Microscopy Imaging/ Potentiostat All-in-One	Host		1 set	Standard
Power Adapter	Accessory	220V/AC	1 piece	Standard
USB Cable	Accessory	Micro USB-A	1 piece	Standard
Electrochemical Raman In -situ Cell	Accessory		1 piece	Standard
Working Electrode	Accessory	Glassy Carbon ElectrodeSaturated Calomel Reference ElectrodePlatinum Wire Counter ElectrodeGold Electrode (Optional)Silver Electrode (Optional)	1 each	Standard
Data Cable	Accessory	USB 3.0	1 piece	Standard
Laptop	Accessory		1 set	Optional

Dimensions

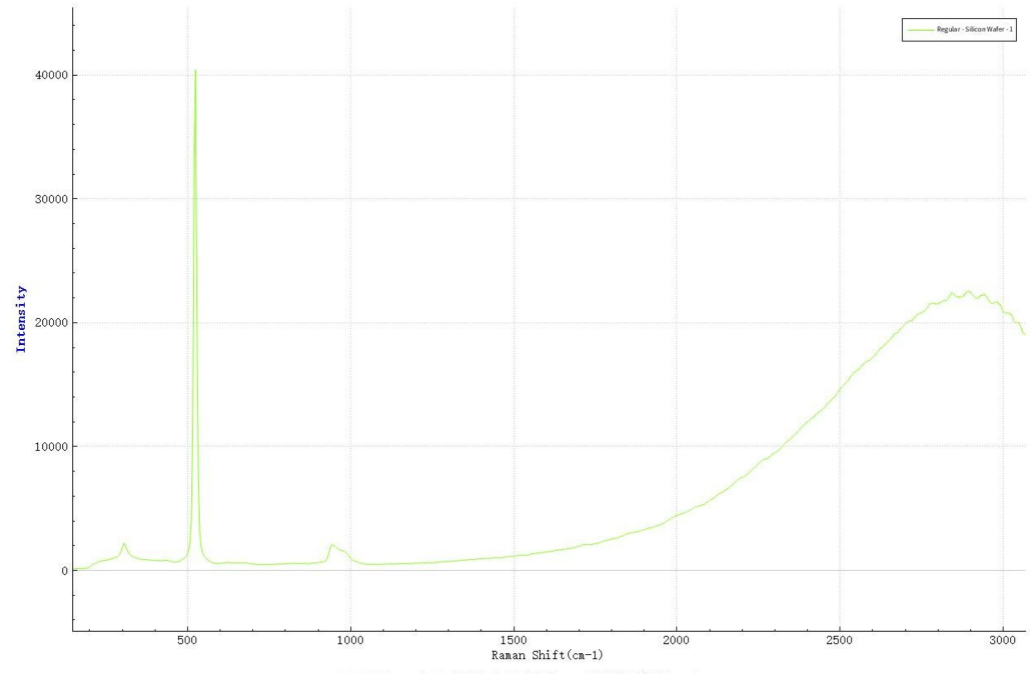


Design architecture

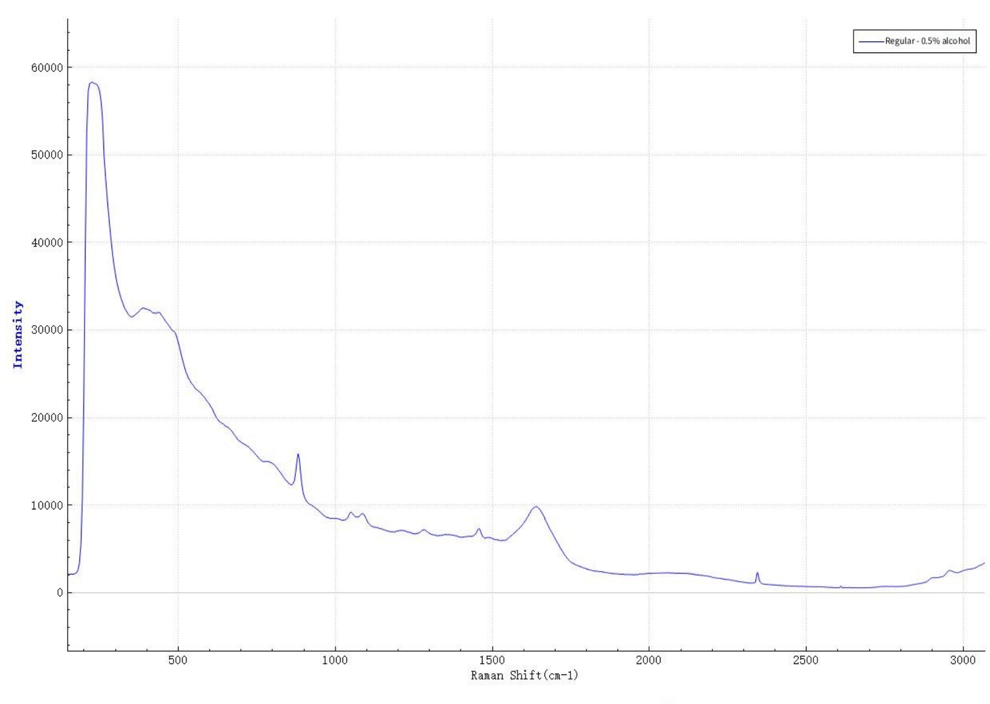


Typical spectra

(1) Silicon wafer
Detection conditions: 50X lens, power 40 mW, time 2 min



(2) 0.5% ethanol
Test conditions: 50X lens, 100% power, 1s



Applications

Using the in-situ electrochemical SERS borrowing strategy, the oxygen reduction reaction (ORR) processes of Au@Pt and Au@PtNi series nanoparticles were studied, and direct Raman spectral evidence of the intermediate OOH was captured (verified by isotope experiments). The results show that Ni doping can enhance the binding force between OOH and the Pt surface, optimize electron transfer, and the adsorption energy of *OOH on PtNi is lower, which can significantly improve ORR activity; adjusting the content of transition metals (TM) in the alloy can further optimize the activity. This strategy provides an effective means for in-situ observation of catalytic processes.

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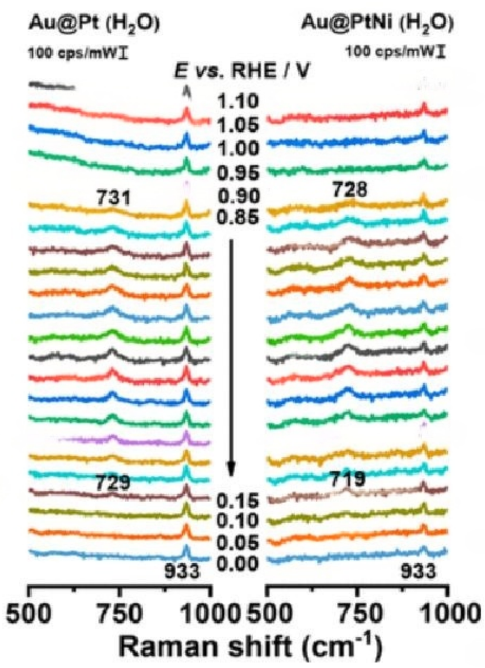
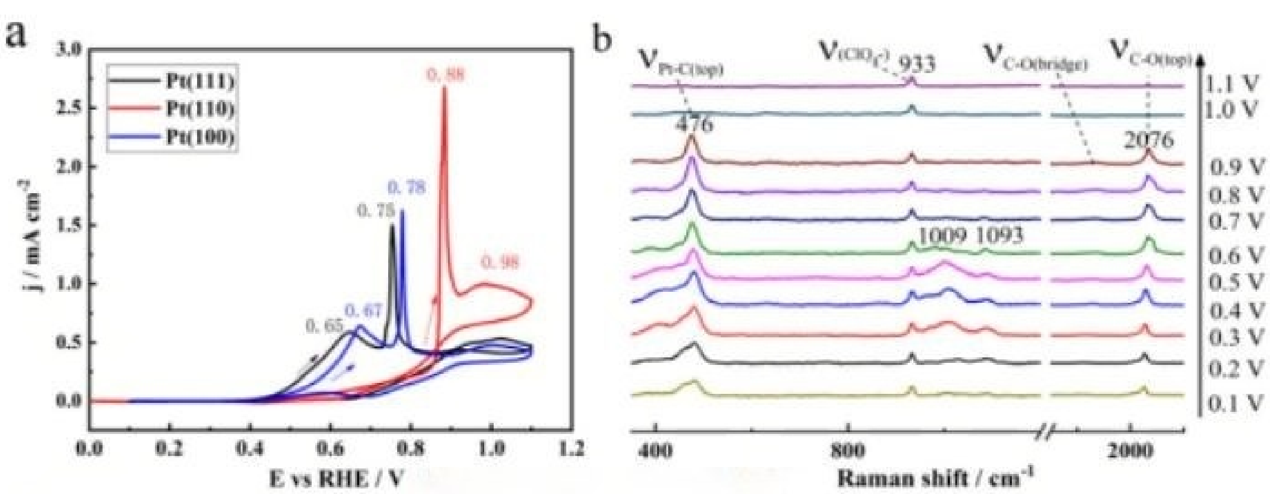


Using in-situ electrochemical shell-isolated nanoparticle-enhanced Raman spectroscopy (SHINERS) combined with theoretical calculations, the electrooxidation behavior of CO on Pt (hkl) surfaces in acidic solutions was studied. The results show that CO on Pt (111) and Pt (100) surfaces has both top-site and bridge-site adsorption, while only top-site adsorption occurs on Pt (110). Verified by isotope substitution experiments and density functional theory, the formation and adsorption of OH and COOH* are crucial for CO electrooxidation and are related to the pre-oxidation peak. This study systematically reveals the adsorption and electrooxidation mechanisms of CO on Pt single-crystal electrodes, providing a new perspective for the design of anti-poisoning and high-efficiency catalysts.



Applications

- material science
- Electrochemical energy conversion
- catalytic reaction
- corrosion process
- Environmental monitoring and protection
- Cultural heritage protection and appraisal biological medicine

Get in touch with our team to explore configurations, request a quote, or learn more about customized solutions tailored to your needs.

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