Shanghai H-Ray S&T Co.Ltd

Focused on R&D, manufacture, marketing and solutions of Proton Exchange Membrane (PEM) water electrolysis

We live Customer Care! Provide our customers with safe and reliable, high-efficient and low maintenance cost solution.

Company profile
About us

Shanghai H-Ray S&T Co., Ltd (H-Ray), with team and technologies originated from Shanghai Advanced Research Institute of Chinese Academy of Sciences, focuses on R&D, industrialization, applications, and solutions of Proton Exchange Membrane (PEM) water electrolysis for H_2 production.

H-Ray adheres to the concept of "focusing on national strategy, benchmarking international advanced standards, advocating collaborative innovation and win-win cooperation", and concentrates on the international leading PEM water electrolysis system. H-Ray carries out R&D and manufacture throughout the whole industry chains, from key components such as membrane electrode assembly, bipolar plate and coating, reliable sealing and high consistency assembly of stacks, to high-efficient system integration and testing. H-Ray offers a series of products dedicated to the applications in green energy, chemical industry, metallurgy, semiconductors, transportation, and distributed energy, etc.

H-Ray, a promoter and leader of industrial development with the goal of achieving global carbon neutrality, dedicates itself to market critical orientations, aims to achieve customer's satisfaction, creates values for employees, shareholders and the society, and strives to create an innovative source of PEM water electrolysis for H_2 production.

R&D Center

The core patent for Membrane Electrode Assembly (MEA) -stack assembly-PEM water electrolyzer system.

Continuous innovation to ensure the advancement of performance for the product.

- Overcome the “difficulties” for mass production of the MEAs with low precious metal usage, high consistency and long lifetime, achieving an international leading performance level.

- Solve the “bottlenecks” for the stack assembly with large area, multiple layers and high consistency, single stack power reaching MW level.

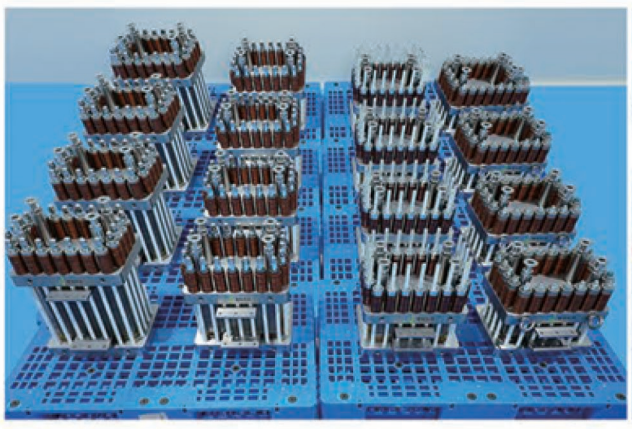
- Establish the verification platform for PEM water electrolysis technology, forming an application evaluation system from core materials, critical components of stacks to systems

Manufacture Center >>>

The mass production for the “MEA- Stack – PEM system” whole industrial chain

World leading MW PEM system in energy consumption

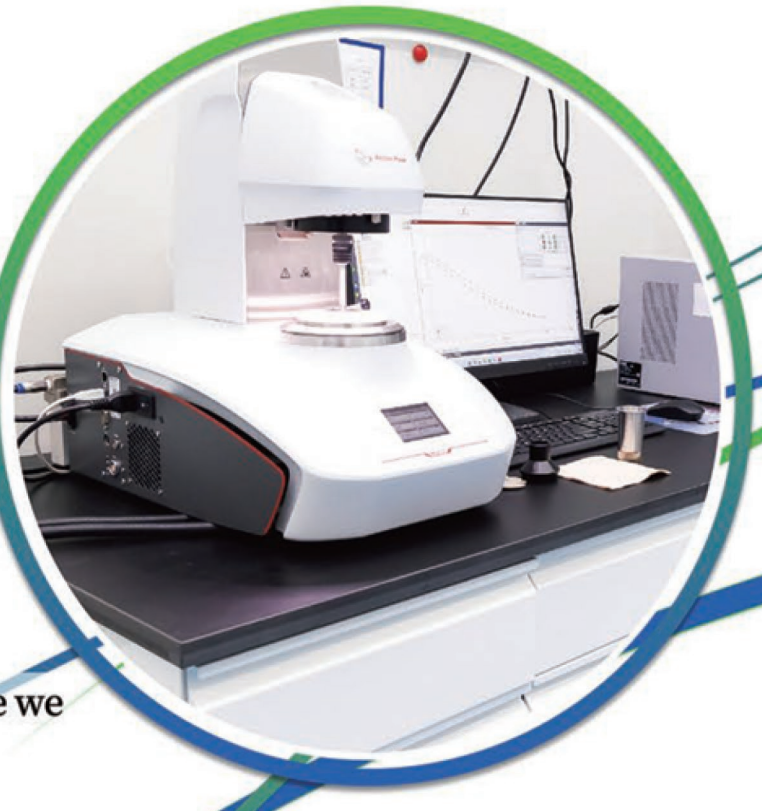
- >20000 m^2/a MEA production capacity (single MEA area can reach 3200 cm^2).
- Production lines for bipolar plate/titanium felt testing, coating, reliable sealing.
- Automatic assembly line for PEM stacks with the capacity of >200 MW /a with the rated power of MW level.
- Engineering, manufacturing, assembly, installation and commissioning, performance evaluation platform for PEM water electrolysis system from 100 kW to MW level.



Quality Control >>>

ISO 9001, CE and ASME certifications, the whole process quality control through our daily manufacturing from raw materials to terminal products.

- H-RAY has established security assessment methods and set up the safety guarantee strategies.
- Quality control and technical specifications, Via our QHSE committee we are engaging all levels within the business to attend, contribute and feedback issues and projects to the team systematically.
- Manufacturing process monitoring and spot-check, full inspection in the whole production line, “find it, report it and solve it” in the pursuit of continual improvement.



Anode: $H_2O \rightarrow 1/2O_2\uparrow + 2H^+ + 2e$

Cathode: $2H^+ + 2e \rightarrow H_2\uparrow$

Total reaction: $H_2O \rightarrow H_2\uparrow + 1/2O_2\uparrow$

Low Cell Voltage & High Stable MEA

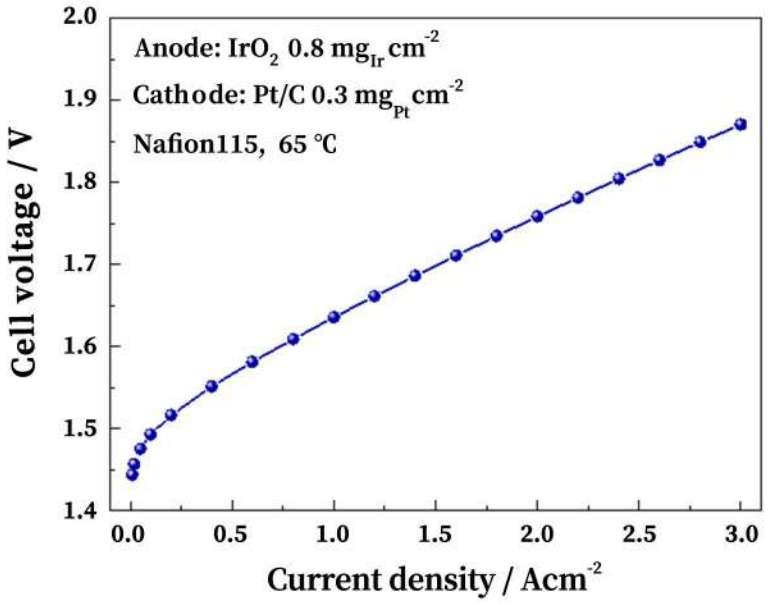
- Precious metal usage⩽1.1 $mgcm^{-2}$
- The difference between max and min voltage is only 8 mV,
- Excellent consistency

- Decay rate of ⩽ 5 μV/h
- Outstanding stability

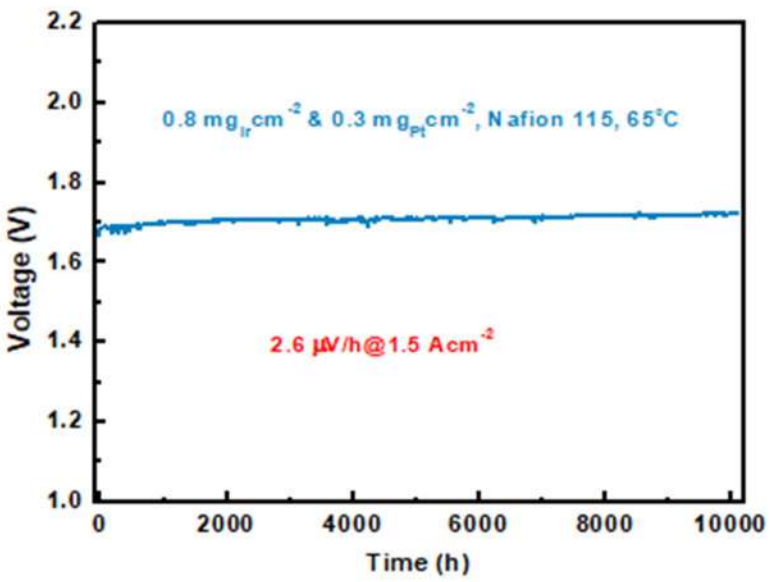
- Thin reinforced PEM issues a decreased cost for PEM stacks

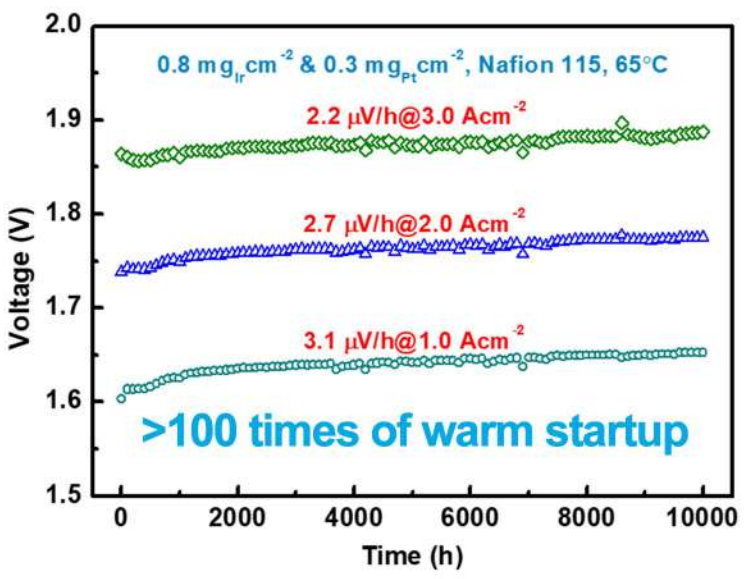
"Roll-to-Roll" manufacture of the membrane electrode assemblies (MEAs) with great advantages in low precious metal usage, high activity, outstanding stability and excellent consistency. MEAs can be flexibly customized.

Polarization curve based on Nafion115



Lifetime of the MEAs





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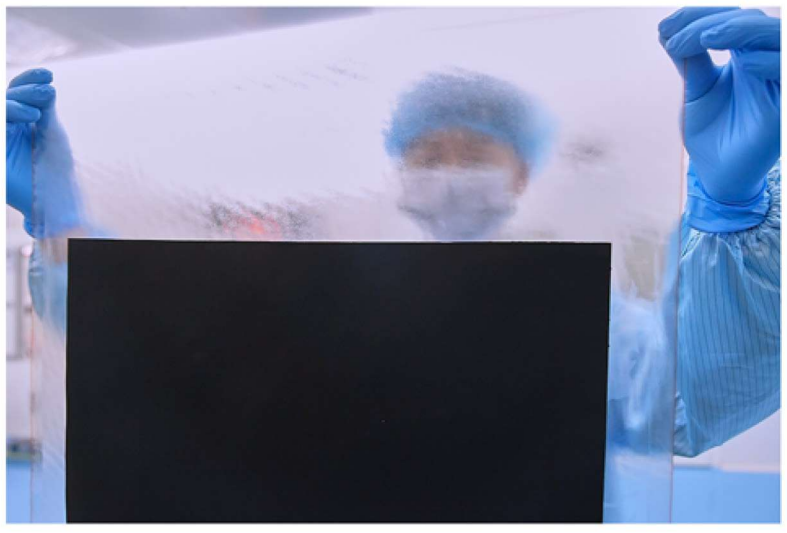
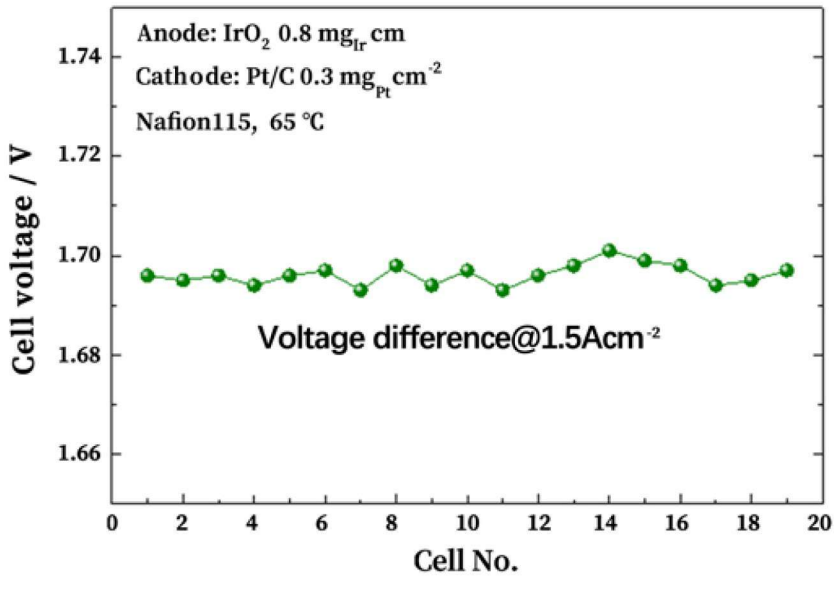
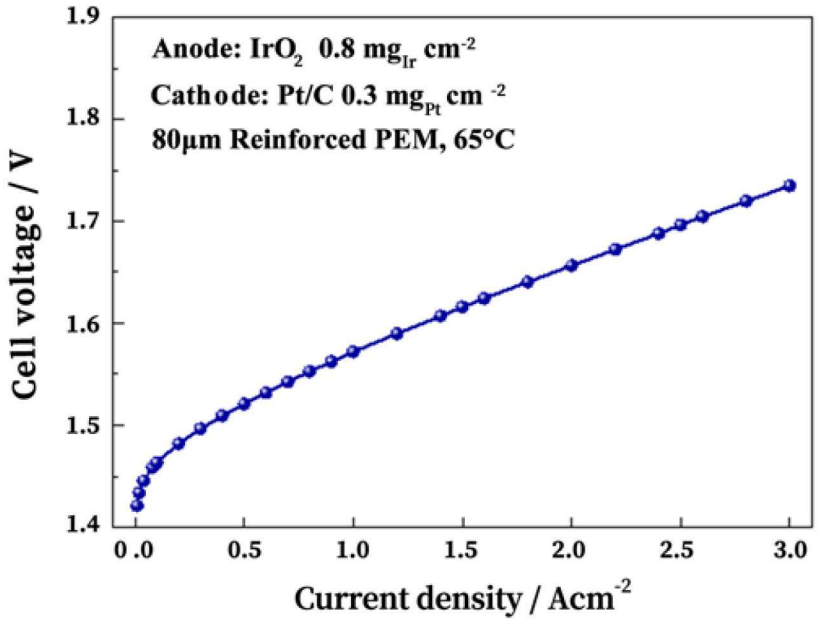
Low Cell Voltage & High Stable MEA

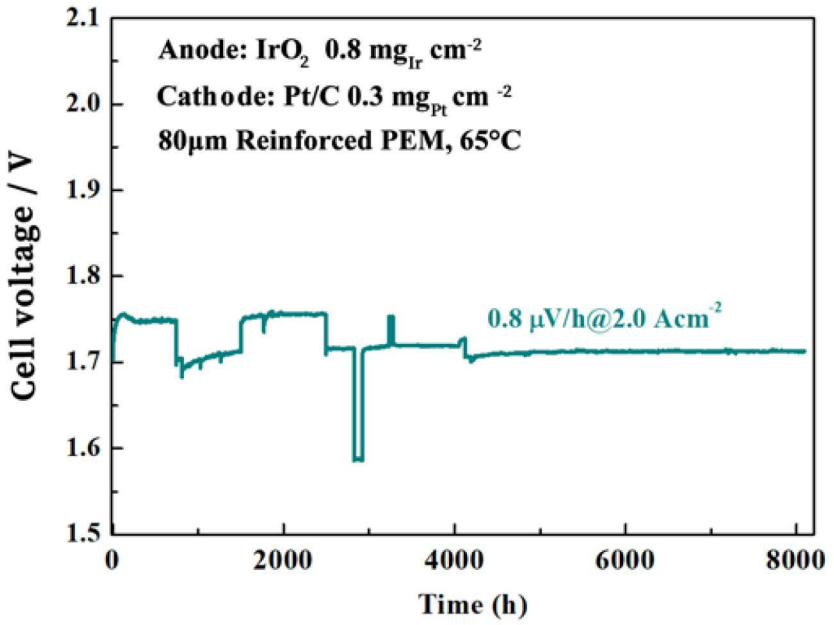


Consistency of the MEAs based on Nafion115

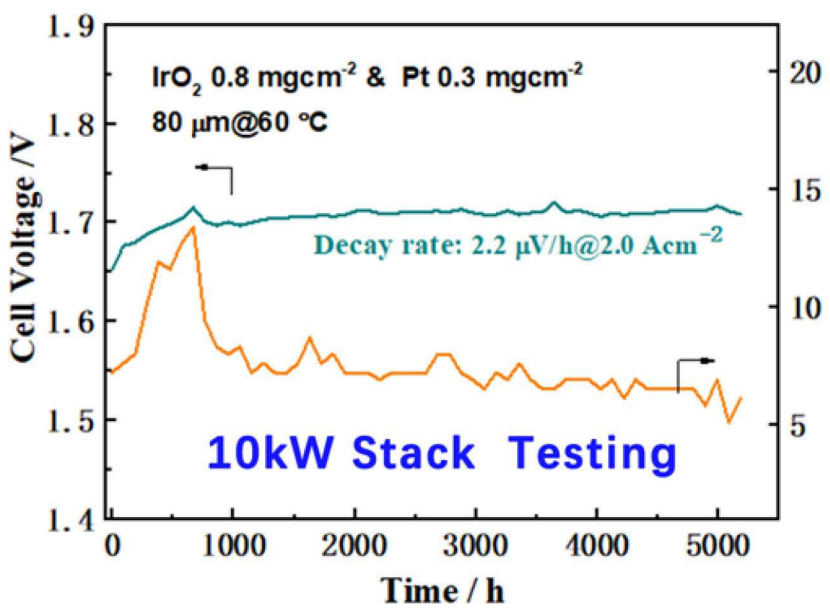


Performance of the MEAs with Reinforced PEM

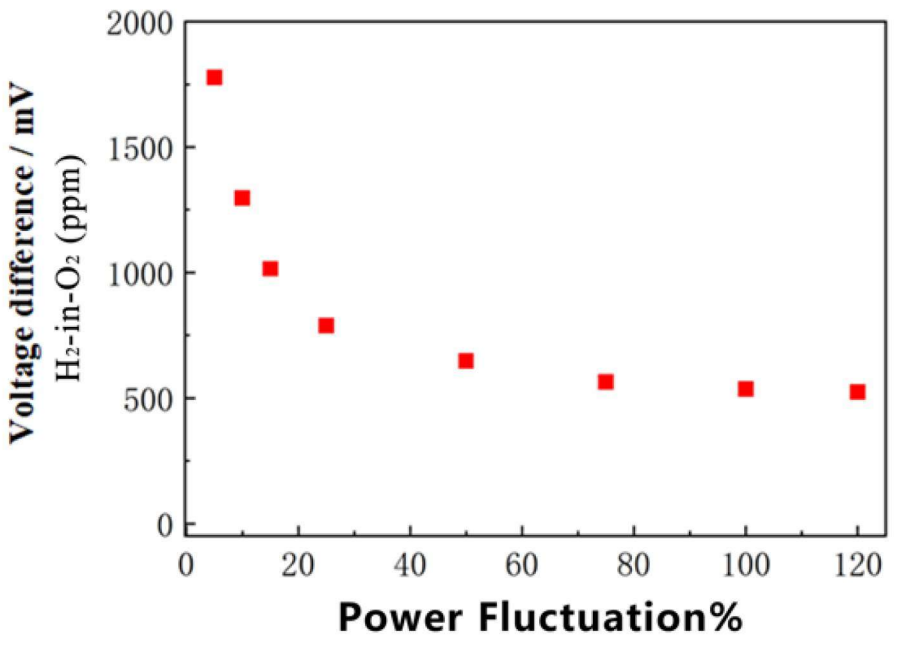




Performance and voltage difference of 10 kW stack

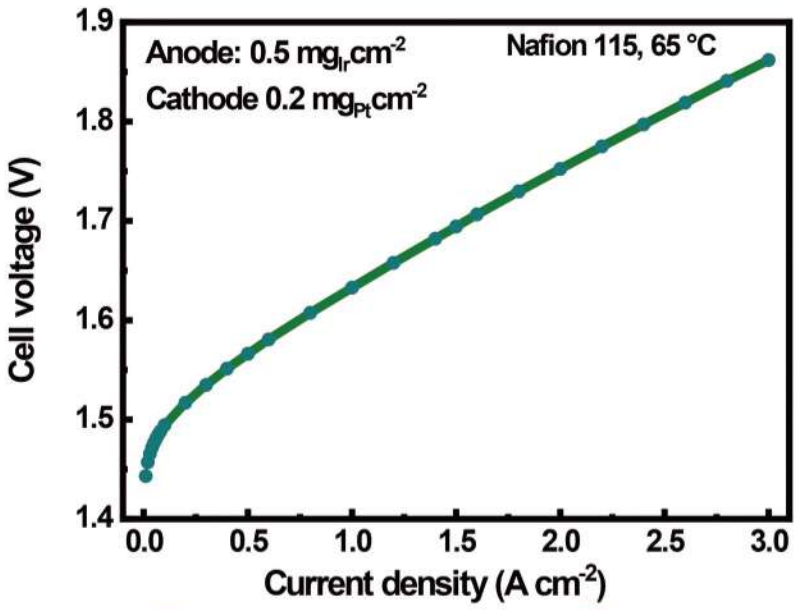


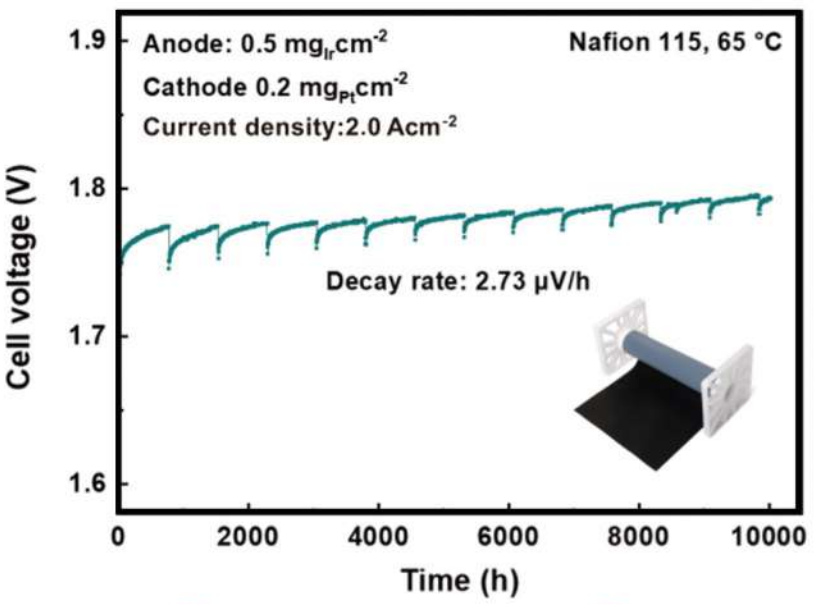
H_2 concentration in O_2 after 5000 h stack-testing



Low Cell Voltage & High Stable MEA

Low-PGM MEA





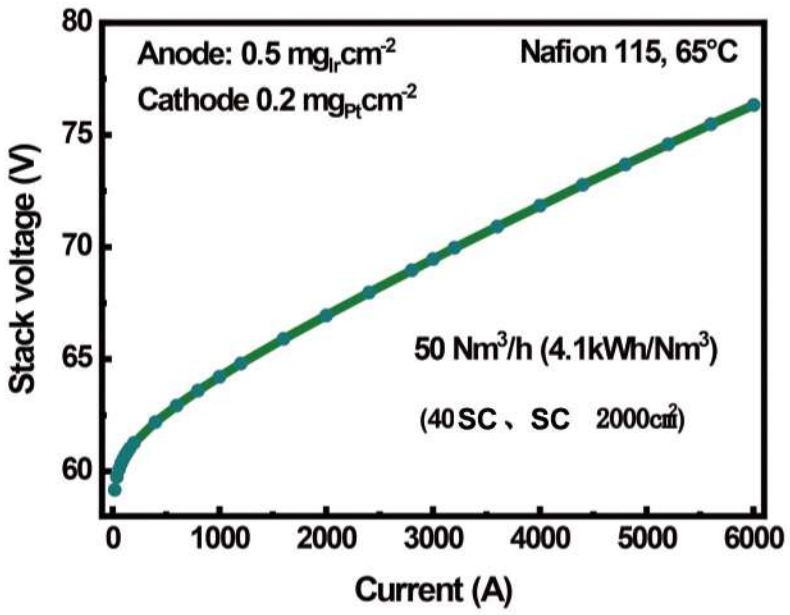
Low PGM Usage
0.5 mg_{Ir} cm^{-2}
0.2 mg_{Pt} cm^{-2}

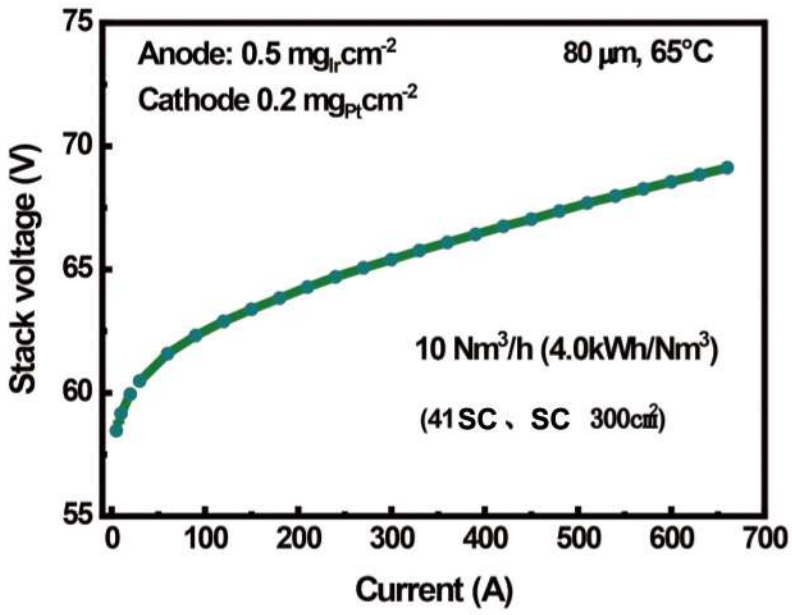
Low Operating Voltage
≤1.70 V@1.5 Acm^{-2}(N115)
≤1.70 V@2.0 Acm^{-2}(80 μm)

High Uniformity
Batch range ≤10 mV

Long Durability
Design Life ≥100,000 h
measured value ≤3 μV/h@10,000 h

Low-PGM PEM Stack





Rated energy consumption<4.1 kWh/Nm³@1.5 Acm⁻²(N115) and <4.1 kWh/Nm³@2.0 Acm⁻²(80 μm), 10%-120%power range hydrogen concentration in oxygen≤0.25%.

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Compact & High - Efficiency PEM Stacks

- High current density, high consistency
- Reliable sealing, high hydrogen production pressure
- Low energy consumption, long lifetime

Specifications

Product Model	HYZER-3-16-4.1	HYZER-5-16-4.1	HYZER-10-16-4.1	HYZER-15-16-4.1
Rated Hydrogen Production Rate	3 Nm^3H_2/h	5 Nm^3H_2/h	10 Nm^3H_2/h	15 Nm^3H_2/h
Rated DC Energy Consumption	4.1 kWh/Nm^3H_2			
MEA Effective Area	300 cm^2			
Cell Number	12	27	40	60
Operation Temperature	65±5 ℃			
Ambient Temperature	5~40 ℃			
Initial Hydrogen Purity	The oxygen content in the outlet hydrogen is <500ppm, and the water content is saturated			
Hydrogen Pressure	≤ 1.6 MPa (Differential)			
Oxygen Pressure	Atmospheric pressure			
Rated Power	12.3 kW	20.5 kW	45 kW	65 kW
Operation Range	10 % ~110 % (Optional)			
Design Lifetime	≥ 80,000 h			
Water Requirement	≥10 MΩcm (≤0.1 us/cm)			
Flow Rate	0.2 m^3/h (Adjustable)	0.5 m^3/h (Adjustable)	0.5 m^3/h (Adjustable)	0.5 m^3/h (Adjustable)
Dimensions（mm)	400×300×400	400×300×450	400×300×550	400×300×650
Weight	<100 kg	<150 kg	<200 kg	<250 kg

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Compact & High - Efficiency PEM Stacks

Low energy consumption
Long Lifetime

Significantly reduces operation and maintenance costs

High hydrogen production pressure
Differential pressure design

Significantly reduces initial investment cost

High consistency stack

Voltage deviation ≤ 20 mV

Specifications

Product Model	HYZER-100-16-4.1	HYZER-150-16-4.1	HYZER-200-16-4.1	HYZER-250-16-4.1
Rated Hydrogen Production Rate	100 Nm^3H_2/h	150 Nm^3H_2/h	200 Nm^3H_2/h	250 Nm^3H_2/h
Rated DC Energy Consumption	4.1 kWh/Nm^3H_2			
MEA Effective Area	2000 cm^2			
Cell Number	58	87	116	145
Operation Temperature	65±5 °C			
Ambient Temperature	5~40 °C			
Initial Hydrogen Purity	The oxygen content in the outlet hydrogen is <500ppm, and the water content is saturated			
Hydrogen Pressure	≤ 1.6 MPa (Differential)			
Oxygen Pressure	Atmospheric pressure			
Rated Power	412 kW	617 kW	823 kW	1029 kW
Operation Range	10 % ~110 % (Optional)			
Design Lifetime	≥ 80,000 h			
Water Requirement	≥10 MΩcm (≤0.1 us/cm)			
Flow Rate	16.1 m^3/h	24.7 m^3/h	32.3m^3/h	40.4 m^3/h
Dimensions（mm)	900×700×1042	900×700×1213	900×700×1385	900×700×1557
Weight	<1045 kg	<1215 kg	<1400 kg	<1600 kg

Ryzer Cabinet System

ISO2273、GB50177

- Low energy consumption
- Long lifetime
- Greatly reduce operation and maintenance costs

Modular design with high integration of the whole system

- High purity hydrogen
- High outlet pressure
- Small volume

Automation, maintenance free, unmanned operation

- Hydrogen detection and alarm system installed

Specifications

Product Model	RYZER –10CMH-1.6-CAB	RYZER –15CMH-1.6-CAB
Rated Hydrogen Production Rate	10 Nm^3/h H_2(Optional)	15 Nm^3H_2/h (Optional)
Rated DC Energy Consumption of Stack	≤ 4.1 kWh/Nm^3H_2	
Rated AC Energy Consumption of System	≤ 4.8 kWh/Nm^3H_2	
Operation Temperature	65±5 ℃	
Ambient Temperature	5~40 ℃	
Initial Hydrogen Purity	≥ 99.999%	
Hydrogen Pressure	≤ 1.6 MPa (Optional)	
Oxygen Pressure	Atmospheric pressure (Optional)	
Cold/Warm Startup Time	≤ 20 Min / 5 Sec	
Operation Range	10 % ~110 % (Optional)	
Design Lifetime	≥ 80,000 h	
Pure Water Request	≥10 MΩcm (≤0.1 us/cm)	
Circulating Water Flow Rate	1.5 m^3/h (Adjustable)	1.8 m^3/h (Adjustable)
Dimensions（mm)	1750×1350×2200	
Weight	< 800 kg	< 1000kg

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Ryzer Cabinet System

- Explosion-proof design, enhanced system safety level
- High hydrogen outlet pressure
- Explosion-proof screen, explosion-proof instruments, highly automated control system
- Modular design, high system integration, compact spatial arrangement
- Long lifetime and low energy consumption

Specifications

Product Model	RYZER –3CMH-1.6-CAB	RYZER –5CMH-1.6-CAB
Rated Hydrogen Production Rate	2-3 Nm^3/h H_2(Optional)	5-6 Nm^3H_2/h (Optional)
Rated DC Energy Consumption of Stack	≤ 4.1 kWh/Nm^3H_2	
Rated AC Energy Consumption of System	≤ 4.8 kWh/Nm^3H_2	
Operation Temperature	65±5 ℃	
Ambient Temperature	5~40 ℃	
Initial Hydrogen Purity	≥ 99.999%	
Hydrogen Pressure	≤ 1.6 MPa (Optional)	
Oxygen Pressure	Ordinary pressure (Optional)	
Cold/Warm Startup Time	≤ 20 Min / 5 Sec	
Operation Range	10 % ~110 % (Optional)	
Design Lifetime	≥ 80,000 h	
Pure Water Request	≥10 MΩcm (≤0.1 us/cm)	
Circulating Water Flow Rate	0.3 m^3/h (Adjustable)	0.8 m^3/h (Adjustable)
Dimensions（mm)	1250×1000×2000	1250×1000×2000
Weight	< 200 kg	< 500kg

Power	10 %	100 %	120 %
Hydrogen In Oxygen	≤ 0.5 %	≤ 0.25 %	≤ 0.25 %

Ryzer Containerized System

ISO2273、GB50177

Low energy consumption, Long lifetime, Greatly reduce operation and maintenance costs

Modular design with high integration of the whole system

High purity hydrogen, High outlet pressure, Small volume

Automation, maintenance free, unmanned operation

Hydrogen detection and alarm system installed

Specifications

Rated Hydrogen Production Rate	200 Nm³/h	250Nm³/h	400 Nm³/h	500 Nm³/h
H_2 Pressure	1.6 MPa or 3.5 MPa (Optional)			
H_2 Purity	≥99.999 %			
Pure Water Request	≥10 MΩcm (≤0.1uS/cm)			
Operation Temp.	65 ±5 ℃			
The Number of PEM	1	1	2	2
Cooling Water Temp.	20 ±3 ℃			
AC Voltage Input	380 V			
DC Energy Consumption of Stack	≤ 4.1 kWh/Nm³ H_2			
AC Energy Consumption of System	≤ 4.8 kWh/Nm³ H_2			
Cold/Hot Startup Time	≤ 20 Min / 5 Sec			
Operation Range	10 % ~100 %			
Container Size	40 feet			
Weight	30 Ton			

On-site Interface Parameter Requirements:

Item	Qty	Customers providing
Power Supply	1	10kV / 380 V , 50Hz
Nitrogen Gas	1	0.7~0,8 Mpa , ~300L/min
Pressure Air	1	0.5~0.6 Mpa , ~200L/min
Tap Water	1	>0.75M³/h , 0.3 MPa , 5~25° , 4~6 barg

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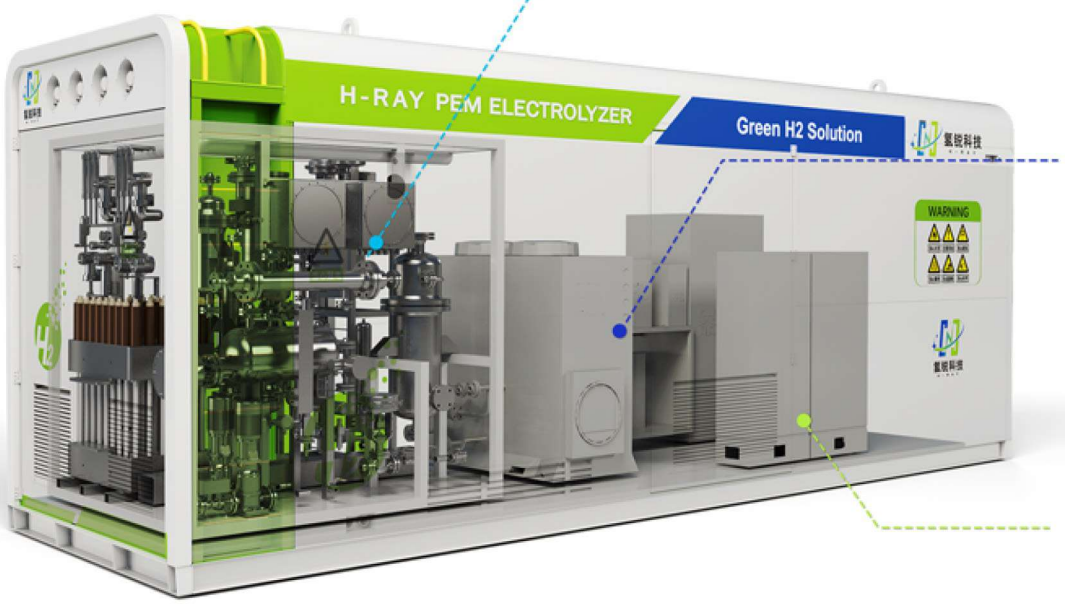
Ryzer Containerized System



Explosion-proof design: Hydrogen production core area

- Electrolyzer
- Gas-liquid separation
- Hydrogen purification
- Analysis instrument
- Hydrogen safety monitoring

Explosion-proof design: Cooling System

- Outdoor explosion-proof chiller

Auxiliary system area:

- Rectifier
- Control cabinet
- Electrical cabinet
- Water purification

Specifications

Rated Hydrogen Production Rate	20 Nm³/h	50 Nm³/h	100 Nm³/h
H_2 Pressure	1.6 MPa or 3.5 MPa (Optional)		
H_2 Purity	≥99.999 %		
Pure Water Request	≥10 MΩcm (≤0.1uS/cm)		
Operation Temp.	65 ±5 ℃		
Cooling Water Temp.	20 ±3 ℃		
AC Voltage Input	380 V /50 Hz		
DC Energy Consumption of Stack	≤4.2 kWh/Nm³ H_2		
AC Energy Consumption of System	≤4.8 kWh/Nm³ H_2		
Cold/Warm Startup Time	≤20 Min / 5 Sec		
Operation Range	10 % ~100 %		
Container Size	20 -45 Feet		
Weight	<15 Ton	<20 Ton	<25 Ton

On-site Interface Parameter Requirements:

Item	Qty	Customers providing
Power Supply	1	380 V , 50Hz
Nitrogen Gas	1	0.7~0,8 Mpa , ~300L/min
Instrument Gas	1	0.5~0.6 Mpa , ~200L/min;
Tap Water	1	>0.5 M³/h , 0.3 MPa , 5~25° , 4~6 barg

Typical Cases

Since being delivered to power station in 2023, the two sets of 10Nm³/h PEM electrolysis cabinet system have maintained efficient operation, earning deep trust from customers with their long-lasting stability.

In 2024, a 20 Nm³/h containerized PEM electrolysis system will be delivered to CIMC ENRIC Hydrogen Energy Co., Ltd., for on-site hydrogen production, compression, and refueling, meeting the daily hydrogen needs of 30 fuel cell forklifts in the hydrogen valley.

H-RAY delivered a 15 Nm³/h containerized PEM system to Messer GmbH Since 2024, This system continuous operation, stable supply of high-purity hydrogen to glasses industry, effectively reducing H_2 consumption costs for end user and has achieved over 10,000 hours of trouble-free operation to date.

In 2025, a set of "power-hydrogen-power" integrated containerized system was delivered to a domestic Plateau areas (places with low oxygen), 5 Nm³/h PEM electrolyzer, 10 kg hydrogen storage, and 10 kW fuel cell system, meeting a 200kWh power supply demand, and has accumulated over 2,000 hours of stable operation.

In 2025, a customized 5Nm³/h PEM electrolysis cabinet-type system was successfully delivered to DEC Fuzhou Institute for a demonstration project in offshore wind farm in Fujian. The project has passed acceptance inspection and received high praise from the client.

In 2025, a customized PEM electrolysis with compression integrated system successfully delivered to a fine chemical company, capable of supplying 15MPa high-purity hydrogen steadily to downstream process units. The equipment has now successfully passed acceptance and commercial operation.

n 2025, a 100 Nm³/h containerized PEM electrolysis system will be deployed in Shandong Province to supply green hydrogen directly to the Zero-Carbon Industrial Valley. Leveraging its robust performance in safety, efficiency, and deployment flexibility, the system will enable end-to-end green hydrogen delivery within the Valley.

In 2025, an MW-level PEM electrolysis containerized system was successfully delivered to ESKOM, South Africa's national power company. The high-purity hydrogen produced is used not only for generator cooling but also supplied directly to surrounding industrial users via pipelines, significantly reducing the overall cost of hydrogen usage.

中集氢能 CIMC HYDROGEN · acwa · SUNWISE 舜华 新能源 · MESSER Gases for Life · 中国石化 SINOPEC · 北方联合电力 North United Power · CWANINGA · LEAD 先导 · LH 氢导 · 亿华通 SinoHytec · 海卓科技 HAIDRIVER

玉柴芯蓝氢能 · 中国电建 POWERCHINA · Air Liquide · HOUPU · 中国南方电网 CHINA SOUTHERN POWER GRID · H2 Energy · KENTE · DEC 东方电气 DONGFANG ELECTRIC · Eskom · 中国航天 · etc.

>20000 m²/a MEA production capacity

Single Stack H_2 production rate up to 300 Nm³/h，200 MW/a capacity automated stack production line for PEM electrolyzers.

100 kW–MW scale PEM water electrolysis systems.

Honors & Patents >>>

- Construction Method of Ordered Membrane Electrode Assembly Based on Precious Metal Hollow Nanotube Array;
- An Ordered Nanostructured Membrane Electrode Assembly and its Preparation Method;
- Preparation Methods of the Catalyst Coated Membrane and Membrane Electrode Assembly for PEM Water Electrolysis;
- Current Collector and its Preparation Methods and Applications;
- An Hydrogen Purification System and Method;
- Reliable sealing and High Consistency Assembly of PEM Stacks ;
- A Connecting Component, System, and Method for Hydrogen Alarm;
- A Molecular Sieve Regeneration Column and its Regeneration Method .

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