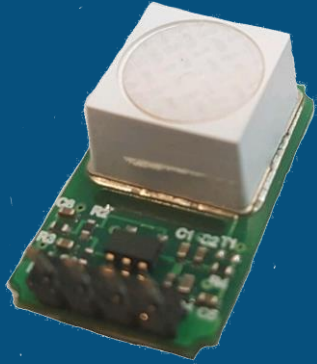


E X S E N
COMPETING TECH

CO2 GAS SENSOR



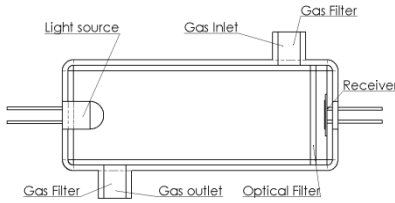
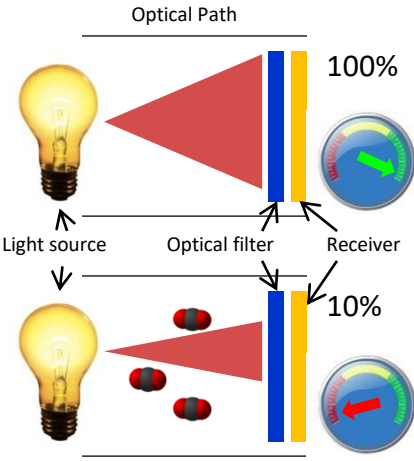
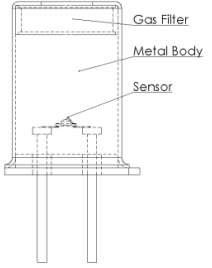
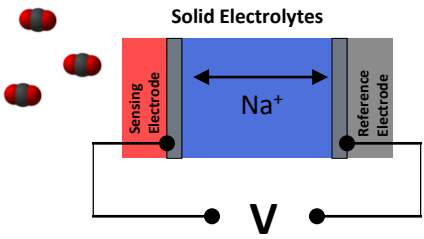
RX-9

- CO2 Gas Sensor
- Minimal Size
- Stable Operating
- Very Good Price

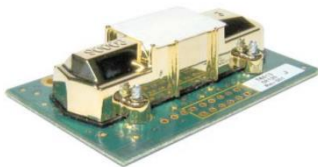


EXSEN INC., CERAMICS BASED ELECTRO-CHEMICAL TYPE SENSOR

Gas Sensor Manufacturer

EXSEN

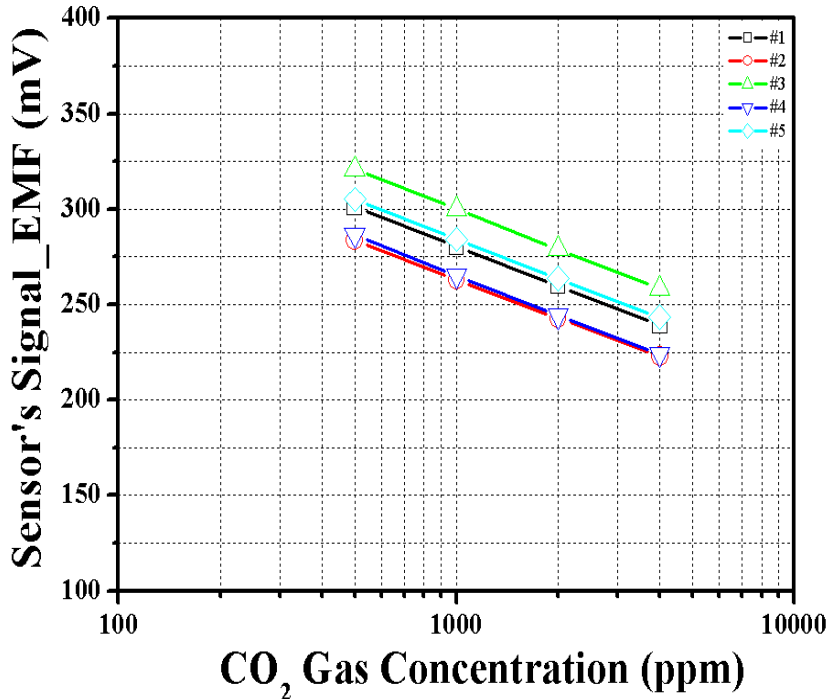
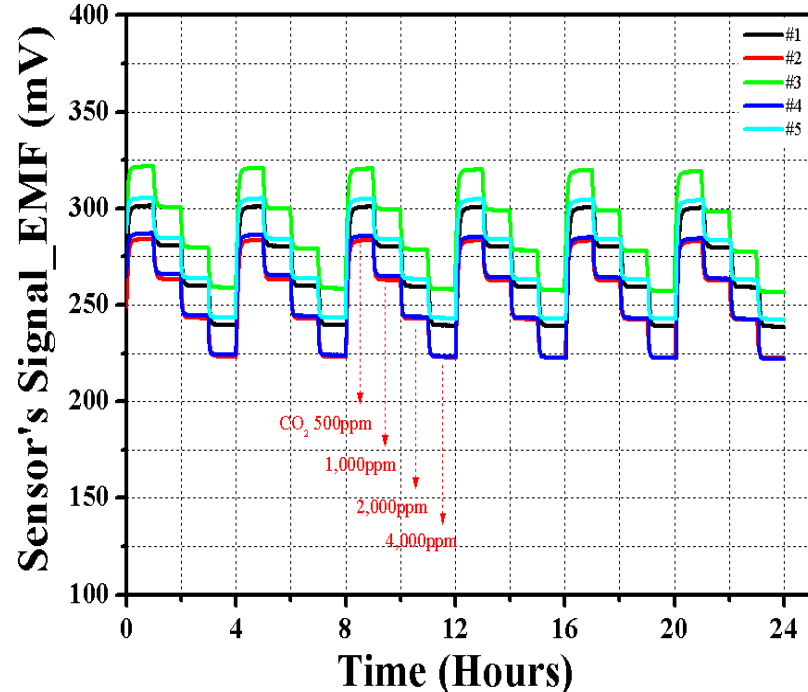
Type	Structure	Operating principle	
<p>Optical (NDIR, Non dispersive Infra ray)</p>	 <ul style="list-style-type: none"> • Main Components - Light source (Lamp) - Optical Filter - Receiver - Optical Path 		<ul style="list-style-type: none"> • CO₂ Gas Absorption Wavelength = 4,260 nm • 4,260 nm Selectivity : Optical Filter & Light source Combination • Receiver Intensity (4,260 nm) $\propto 1/\text{CO}_2$ Concentration • Optical Path length \propto resolution
<p>電氣化學式 (Electrochemical)</p>	 <ul style="list-style-type: none"> • Main Components - Sensor - Gas Filter 		<ul style="list-style-type: none"> • Na⁺ ion movement(@Electrolyte) \rightarrow Sensing Electrode • Voltage between Sensing Electrode and Reference Electrode • Voltage(mV) $\propto 1/\text{CO}_2$ Concentration

COMPETING TECH

		NDIR		Electrochemical		Electrochemical
Sensor structure						
Competitor		Global		KOREA EXSEN (RX-9)		JAPAN F COMPANY CDM4161A
Dimension		44.5 x 35 (mm ²)		12 x 20 (mm ²) Smallest		45 x 26 (mm ²)
Operating Temp		-5~60°C (S company) 0~50°C (E company) -25~55°C (G company) -40~60°C (E2 company) -30~80°C (N company)		-40~60°C (RX-9)		0~50°C (F company)
Reliability	High Temp	Good	<	Very Good	=	Very Good
	High Humi	Good	<	Very Good	>	Good
	Particle resistivity	Bad	<	Excellent	=	Excellent
	Life Time	10 years	=	10 years	=	10 years
Resolution		1 ppm	=	1 ppm	=	1ppm
Cost		100%	<	<50%	>	100%

Characteristics according to CO₂ Concentration Change

As shown by Figure 1, the RX-9 has good response and repeatability to CO₂ gas concentration change and exhibits nearly the same characteristics per sample. RX-9 exhibits a very good linear relationship between Sensor's Signal (EMF) and CO₂ gas concentration on a logarithmic scale.



[Figure 1] Evaluation of sensor performance according to the CO₂ Concentration change.

Comparison of response time with NDIR Sensor

Figure 2 compares the CO₂ output of the RX-9 mounted on the evaluation board with the NDIR sensor. As can be seen, the response and recovery time for CO₂ gas are almost similar.

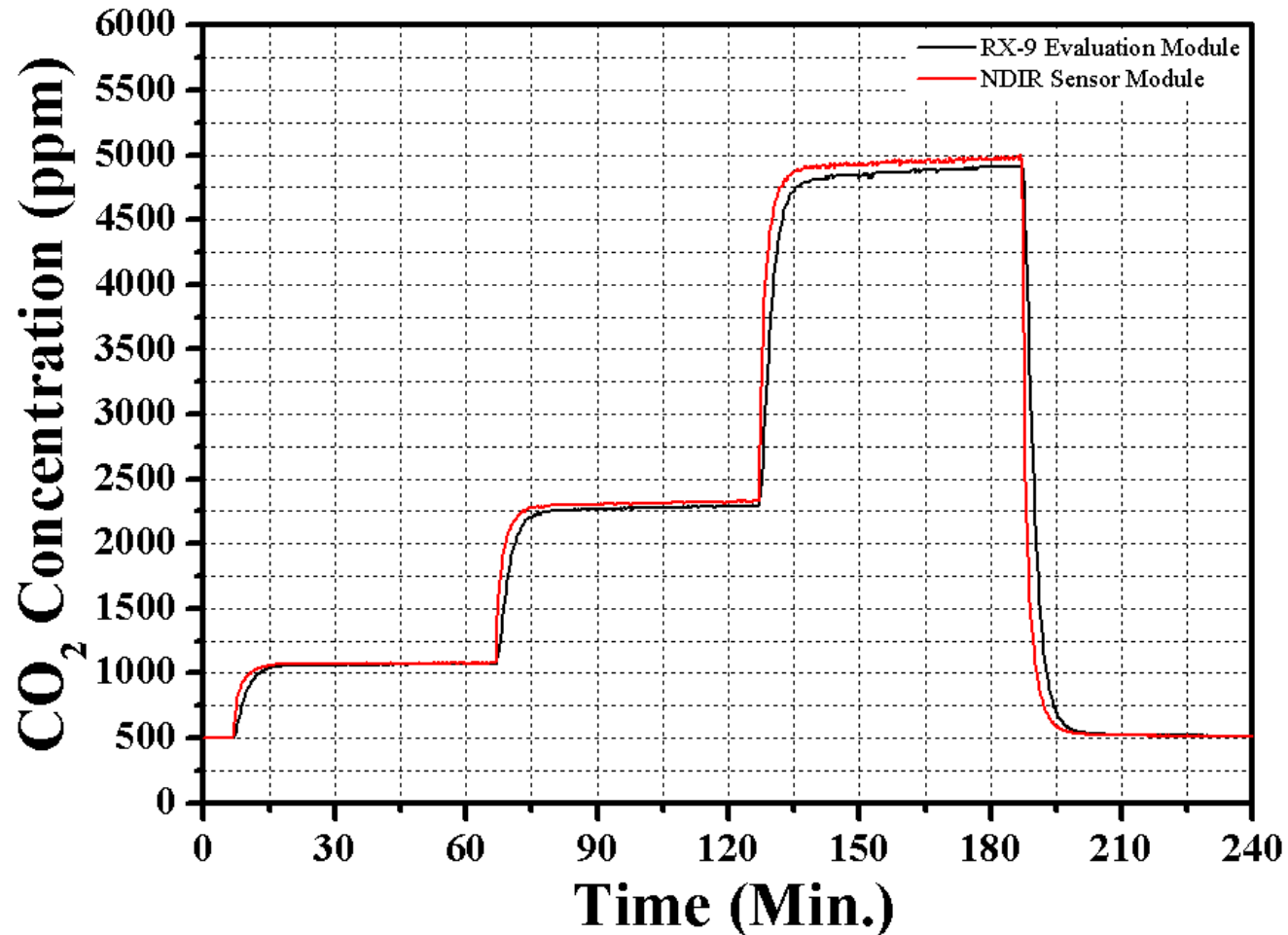


Figure 2. Evaluation of gas response and recovery characteristics.