

NEW

BEL
BEL JAPAN, INC.

Evaluation and Deterioration System for Flat Plate Single Cell in SOFC

BEL-SOFC



► Evaluation and deterioration test for single cell

(I-V, OCP and impedance measurement of Overall cell as well as each electrode by combination with the electrochemical instruments)

► Full automatic system by dedicated software

(Only setting of experimental conditions (temp/ total Flow amount/ gas ratio for anode and cathode))

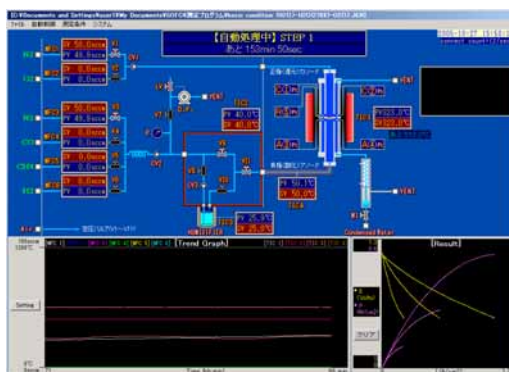
► Easy handling by support software

(Prevention from error in operation by operator)

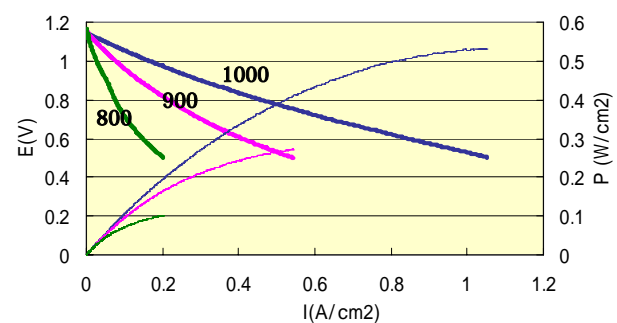
BEL-SOFC is the automatic evaluation and deterioration test system for single plate cell in SOFC. Simple sample setting and exchanging achieves by original reactor.

Impedance, OCP and I-V measurements are controlled by dedicated software and electrochemical instrument, also the data is saved automatically. Support software is incorporated and prevents from the error in complicated operation.

Standard cell (Ni-YSZ |YSZ |LSM dia.: approx. 20mm) is prepared and useful to investigate the various performances and to compare with your cell.



Software Window



Comparison with the cell performance. (800 · 900 · 1000)

Standard Cell : Ni-YSZ |YSZ |LSM Anode : H₂ + H₂O(278K) cathode : O₂

BEL - SOFC Specification		
Sample	Single flat plate (dia. : approx. 20mm)*Other diameters are negotiable	
Gases	H ₂ , O ₂ , N ₂ , CH ₄ , CO, saturated water vapor <u>Anode</u> Mixture of H ₂ , N ₂ , CH ₄ , CO and saturated water vapor (*saturated water vapor is produced by supplying above mixture gas to bubbler.) Each MFC spec. F.S.200sccm, control range: 2-100%F.S., accuracy: ± 2% of F.S. <u>Cathode</u> Mixture of O ₂ and N ₂ Each MFC spec. F.S.200sccm, control range: 2-100%F.S., accuracy: ± 2% of F.S.	
Humidity Control	Bubbling method(5-80) Tank : 250ml (full) Bubbling temperature : 5-80 (Temperature control accuracy within ± 0.2) Relative humidity : saturated humidity will be variable by bubbling temperature change. *Depends on the mixture gases are bubbled into the tank or not.	
Temperature Control	Electrical heating furnace : 400-1000 (accuracy: ± 0.5) ; TIC1 max1200 Air thermostatic chamber : 40-100 (accuracy: ± 0.5) ; TIC2 max120 Bubbling + BEL-thermo : 5-80 (accuracy: ± 0.2) ; TIC3 max80 Flexible heater : 50-100 (accuracy: ± 0.5) ; TIC4 max120	
Pressure	100kPa (Abs) · Diaphragm pump is used for substitution of gases in the case of the gas cylinder changing and liquid water re-filled. (achieving vacuum : approx.350Pa)	
Material	SUS, Brass, FKM, PEEK, Gold, Platinum, ceramic SSA-S · HB tube	
Electrochemical evaluation method	Impedance measurement and I-V measurement by 3 terminal (Each electrode case) and 4 terminal pole (overall cell case) * Electrochemical indicator will be chosen by negotiation.	
Condenser	Set 15 by circulation water bath	
Safety feature	Short circuit breaker, lowering water level alarm, hydrogen detection alarm, CO detection alarm, Methane detection alarm TIC1- temperature highest limit alarm (heater OFF), Heater disconnection alarm (only for TIC1)	
Automatic measurement software	Condition setting : Measurement sequence setting (Temp.·flow·time), Synchronism between the sequence setting and impedance measurement and I-V measurement. Saving format : CSV file Display : Flow chart/TIC1-4, Trend graph of MFC input value/I-V · P result	
Physical	W1100xD600xH1800mm (body : W750xD600xH1425mm) · 150 kg	
Footprint	About 2.0m ² (W2.0m x D1.0m) (w/o electrochemical indicator)	
Other requirements	Computer : Laptop type (recommended) OS: Windows XP, CPU: Intel Pentium III or higher, GPIB : 1 port Memory: 512MB or higher, Serial port (RS-232C) : 2 ports	
Utility	Gas	Connection : Swagelok joint1/8" (side body) N ₂ : 2 ports H ₂ : 1 port O ₂ : 1 port CH ₄ : 1 port CO : 1 port
	VENT	Connection : Swagelok joint1/8" (back body) Main body : 2 ports Vacuum Pump : 1 port
	Power	Main Unit : single phrase AC100V/20A Circulation water bath : single phrase AC100V/8A CPU : single phrase AC100V/2.5A *Power for electrochemical indicator needs to be prepared.
	Others	Spot welding machine 0.5 of Pt wire should be weldable



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