

# New Gas Diffusion Layer with Gas-Flow Channels(GDLFC<sup>+</sup>)

ENOMOTO Co., Ltd / Fuel Cell Nanomaterials Center, University of Yamanashi / Joint development

## [Characteristics]

- Realizes **low cost** and **high conductivity** with carbon fiber sheet bonded with conventional resin
- **Uniform gas diffusion** due to the cross-flow ability
- Minimum **thickness 0.30 mm**
- **Free design** of flow-channels (width  $\geq 0.2$  mm)
- Formed micro-porous layer (**MPL**) on the flat-surface of GDL faced to catalyst layer

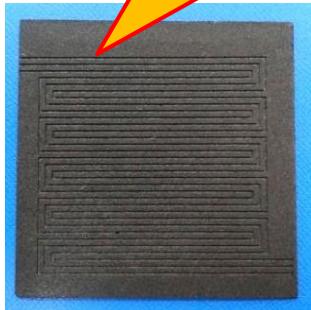
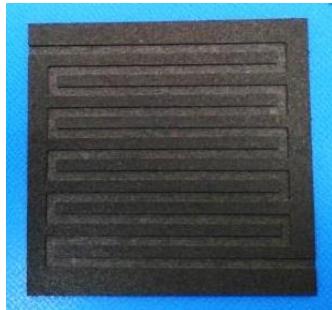
Physical properties	data (※)
thickness	0.30~1.0mm
size	MAX 150×250mm
Electric resistance	MIN 10mΩcm <sup>2</sup>

GDL

Arbitrary design  
of gas flow  
channel

High gas  
diffusivity

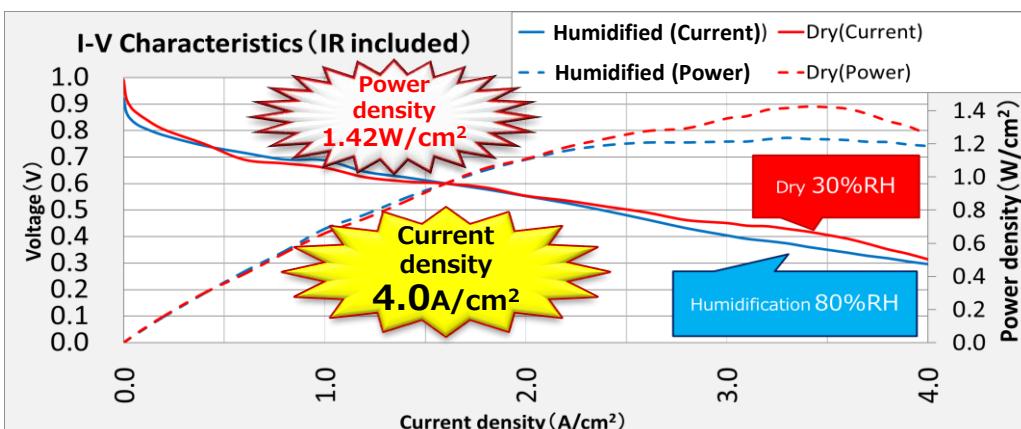
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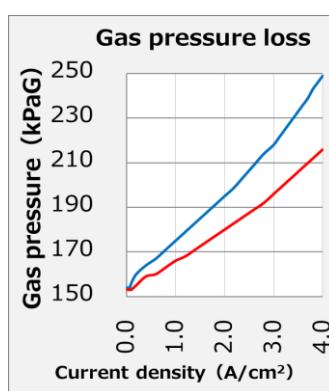
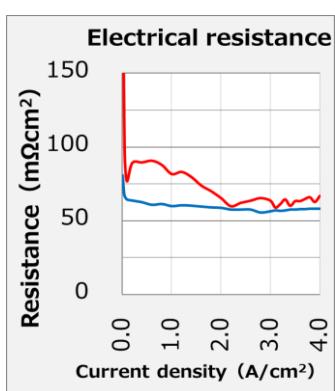
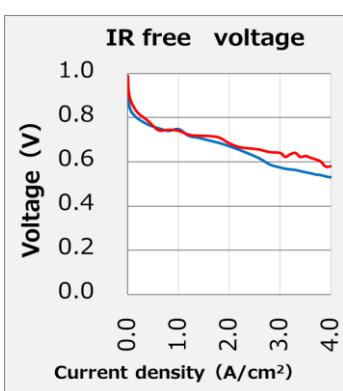
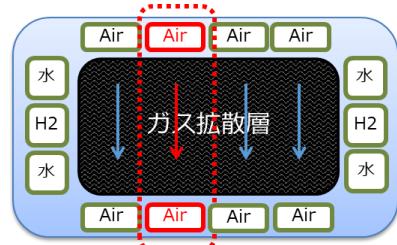
## Power generation characteristics

High performance  
even in dry  
conditions

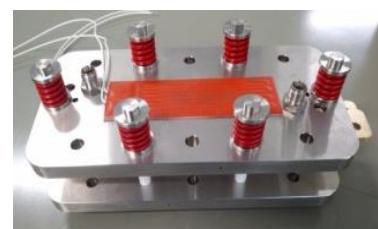
Cell Temp. 80°C、80%/30% RH、U<sub>Air</sub> 4.0%、Back pressure 150kPa、Active Area 29.16cm<sup>2</sup>、PEM 25μm



Newly developed  
bipolar plate +  
GDLFC<sup>+</sup>



Single cell for  
experiments



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# Flat Metal Separator integrated Gas-diffusion Layer (FMSG<sup>+</sup>)

MEXT Regional Innovation and Ecosystem Formation Program Support Project

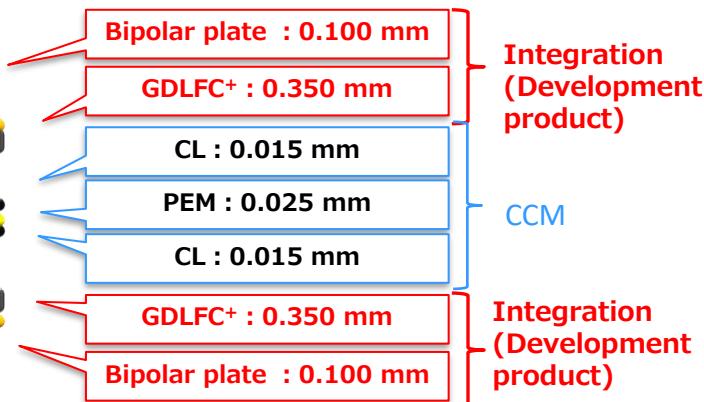
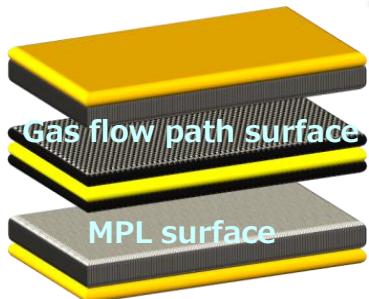


## [Characteristics]

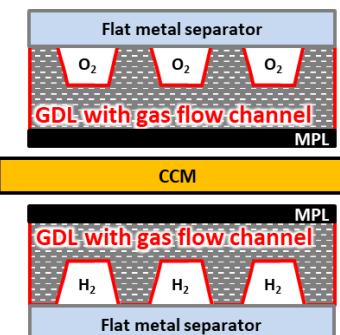
- Gas diffusion layer with gas flow-channels (GDLFC<sup>+</sup>)
- Bipolar plate with thin corrosion-resistant coating of CB/Resin on SUS plate.
- Metal bipolar plate : No press forming of gas-channels
- Simplified stack assembly by integration of the above
- Single cell thickness 0.955mm

Thinning  
Low price  
High power

### Cell components



### Cell cross section



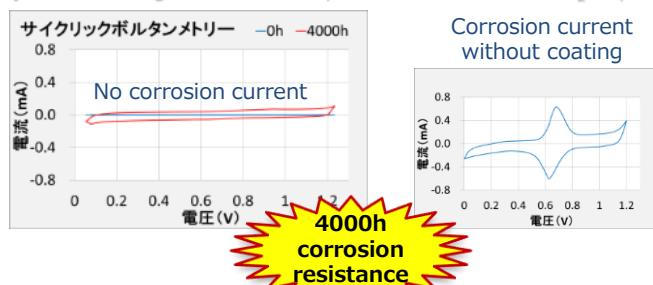
## New FMSG<sup>+</sup> structure

### SUS 304 coated with thin CB/Resin layer



### Corrosion resistance test (Cyclic voltammogram)

Cyclic voltammograms for the test pieces soaked in 0.1mol H<sub>2</sub>SO<sub>4</sub> at 90°C



### Physical properties

### data (※)

thickness

0.010~0.100mm

Electric resistance

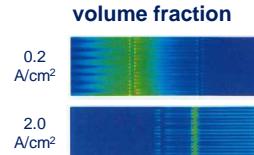
MIN 6mΩcm<sup>2</sup>

### GDLFC<sup>+</sup>

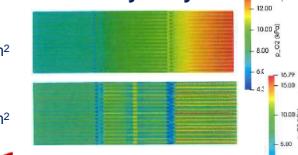


### Simulation analysis (Mizuho Information & Research Institute P-Stack)

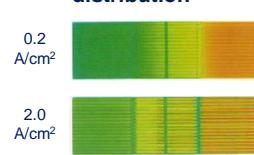
#### GDL liquid phase volume fraction



#### Oxygen partial pressure of catalyst layer



#### Current density distribution



#### Temperature distribution

