

Enjoy Academy, Enjoy Life, Enjoy Tokyo

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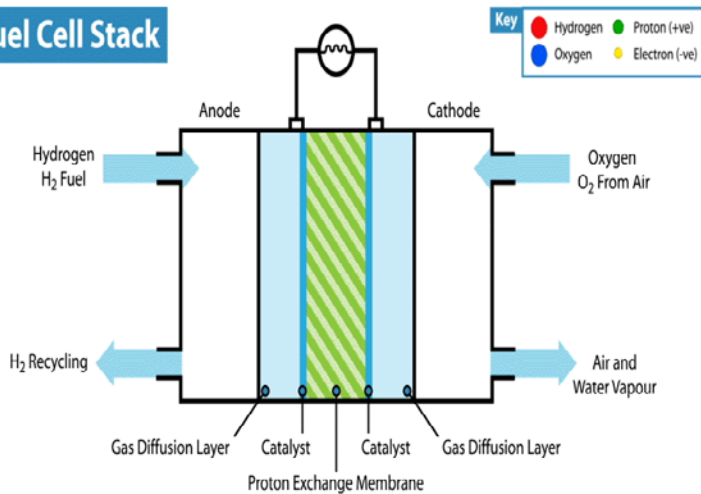
Chemical Resources Laboratory

08/21/2015

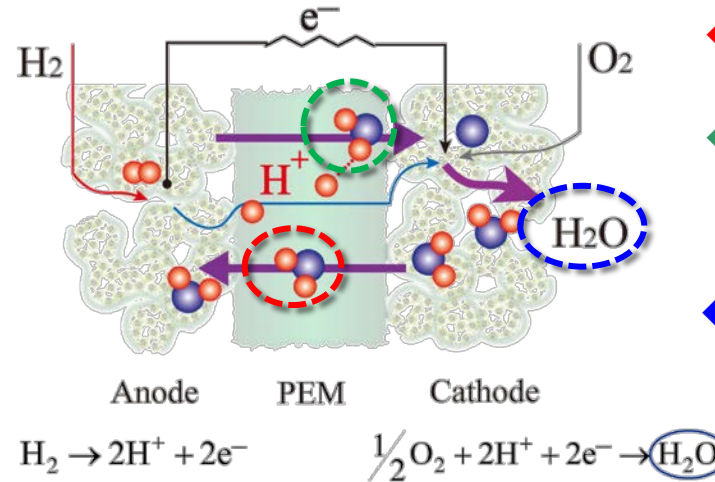
Introduction

PEMFC

Fuel Cell Stack



Water transport in PEMFC



- ◆ Diffusion water
- ◆ Electro-osmotic water
- ◆ Generated water

**Low humidity: fuel cell IR resistance will be too high.
High humidity: flooding in catalyst layer(cathode).**

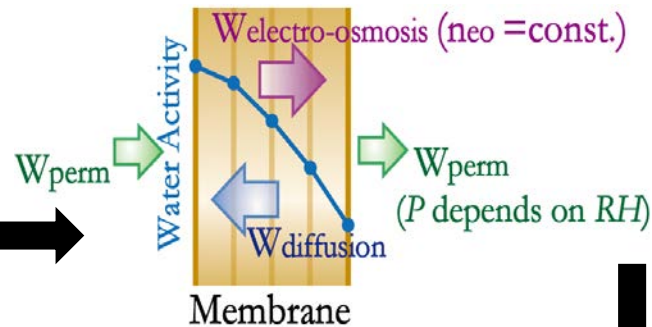
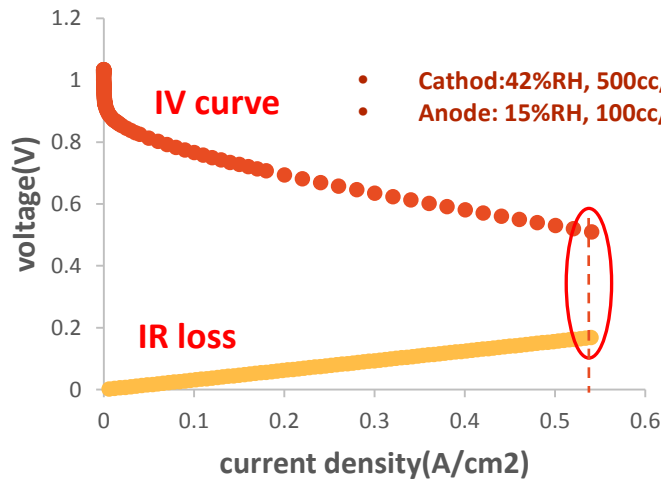


Fuel cell performance will decrease.

Therefore, water management is very important.

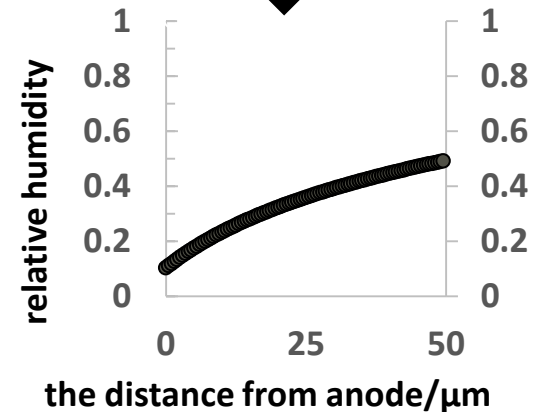
Numerical Simulation for Water Transport inside the Fuel Cell Membrane

experiment result



Assumption:

- P is related with RH.
- n_{eo} is not related with RH.



Simulation result of water distribution

My purpose:

Prove the simulation result of **low humidity condition with experiment method.**

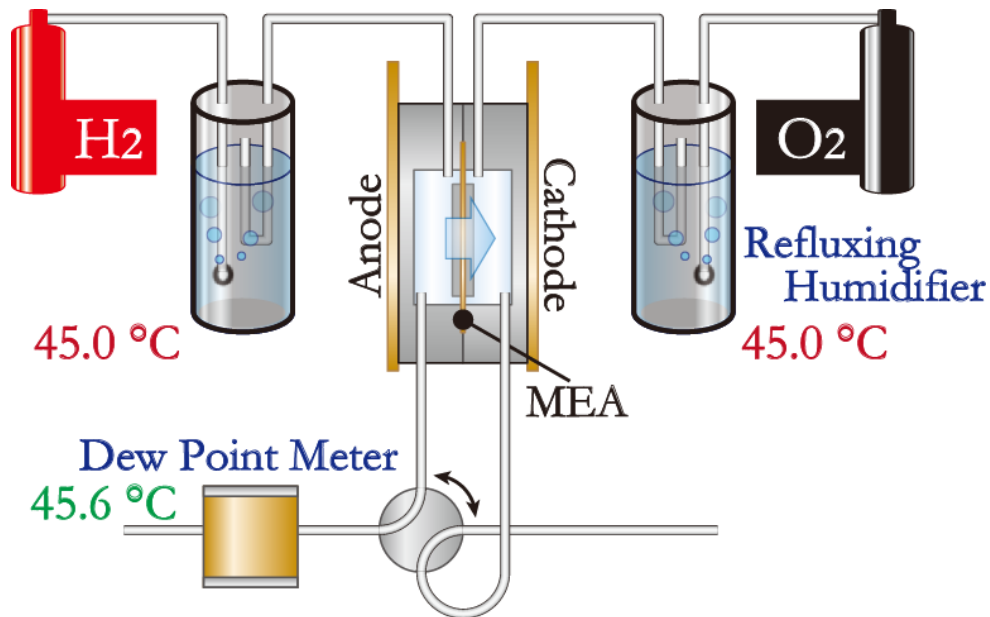
Experimental Setup

Anode:15%RH

H₂ 100 [mL/min]

Cathode:42%RH

O₂ 500 [mL/min]



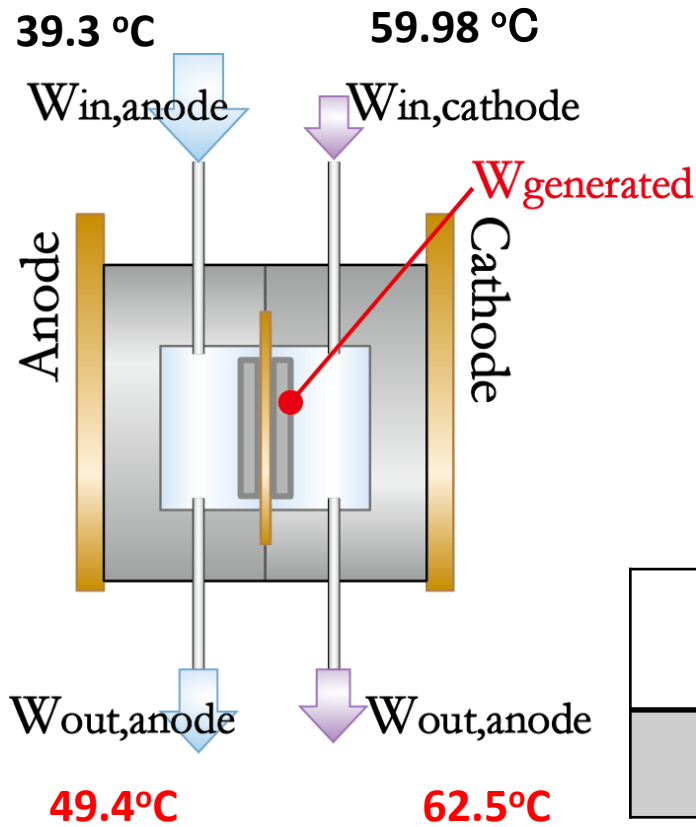
I observed:

Outlet RH
(dew point)



- Check water mass balance
- Compare with simulation result

Confirmation of the Water Mass Balance



Calculation

The equation of water balance:

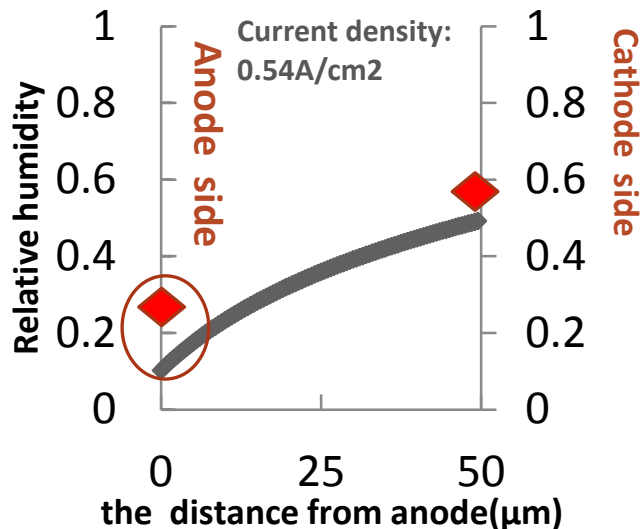
$$W_{in,anode} + W_{in,cathode} = W_{out,anode} + W_{out,cathode} - W_{generated}$$

	$W_{in,anode} + W_{in,cathode}$	$W_{out,anode} + W_{out,cathode} - W_{generated}$
Water amount (mol/s)	7.4E-05	7.5E-05

Therefore, water mass balance is achieved.

Coincidence Between Experiment and Simulation

water distribution inside membrane



- Experiment value
- Simulation value

Conclusion

Simulation assumption:

- P is related with RH.
- neo is not related with RH.



- We should consider **the relationship between neo and RH.**
- Low humidity condition will do harm to fuel cell performance.

There is difference of RH in anode side between experiment and simulation result.

Experience in NIPPON!

Shock 7

If you want your grandmother look more fashionable, I recommend you show her how Japanese old ladies dress themselves.

Shock 6

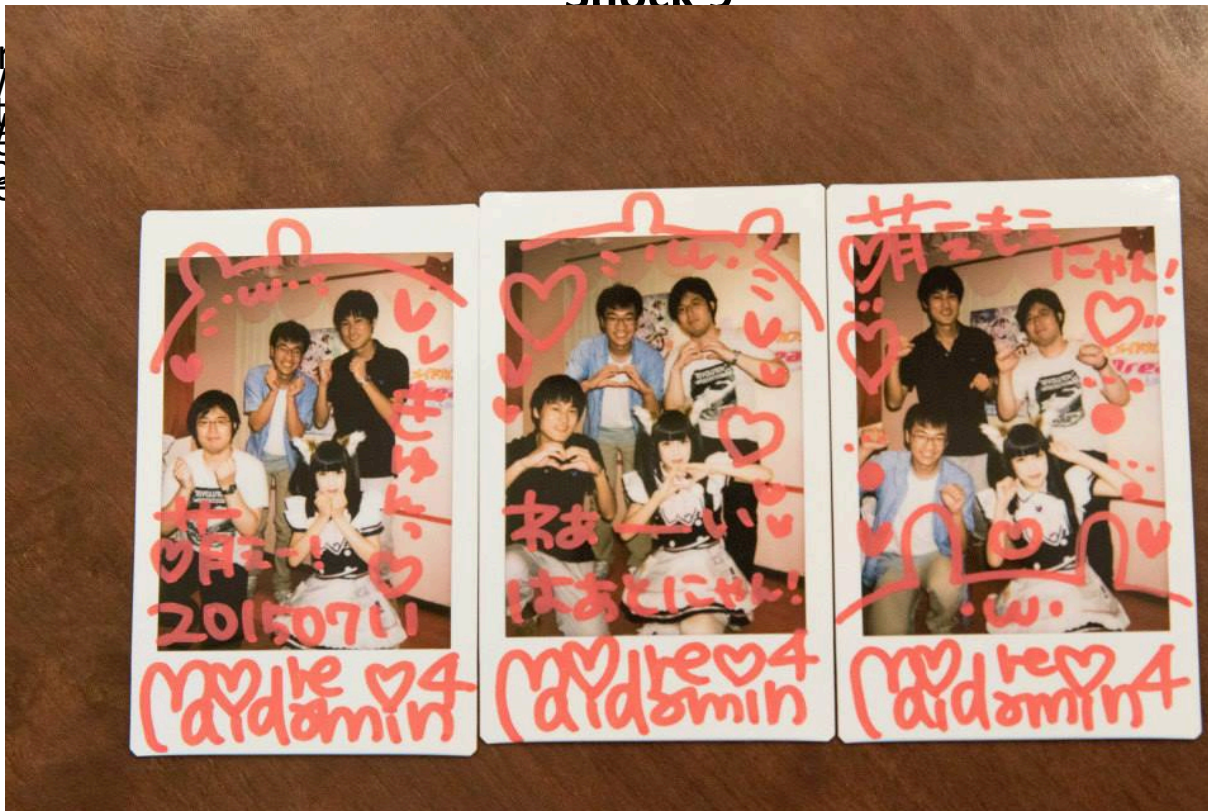
Japanese people have two faces. One face is in office and the other face is in Izakaya(drinking house). They are just crazy.

Experience in NIPPON!

Shock 9

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Experience in NIPPON!

Shock 1

I was prepared to take a holiday in Japan. But the reality is that I stay in lab and classroom all day long except weekends. But it is the most meaningful holiday that I have ever had.

Shock2

: what's the most beautiful place in Tokyo? I think it's Yokuhama.

Shock 5


Japanese toilet is really advanced.

Shock 4

When staying in Japan I keep wondering why Japanese streets are so clean? Maybe it's because there no trash can.

Shock 3

The hanabi show is really terrific. It also shows how rich is Japanese government. And thanks for our scholarship.



Acknowledge

Professor Takeo Yamaguchi

Assistant Professor Yuhei Oshiba

Assistant Professor Hidenori Ohashi

MD student Hiroto Okuyama

Professor Hara and all staff for CAMPUS Asia

Thank you & 谢谢!

2015.08.21

