Micro-Fuel Cell

High-Efficient proton conductor Nanochannels array based on a ferroelectric proton transfer phase substrate

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1. Abstract

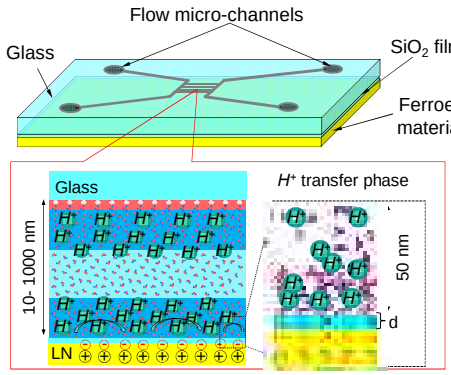
A micro-fuel cell (μ-FC) device on microfluidic chip platform with assistance of a $LiNbO_3$ (LN) material has been realized.

1. Realized high efficient protons conductor device based on LN material
2. Designed and fabricated a μ-FC device with assistant of LN material on microfluidic chip platform
3. Working principle of the μ-FC device was verified

2. Creation of high efficient H^+ conductor device

Device Design

Proton conductor device based on LN material

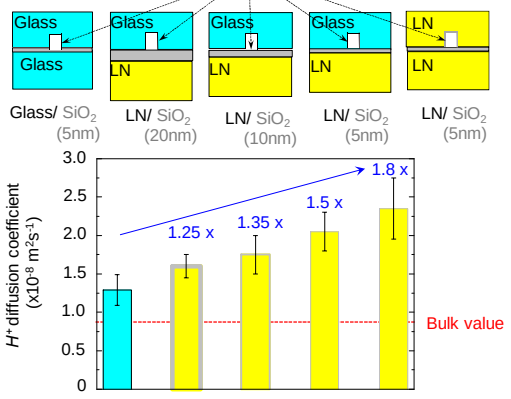


Prediction

Electrostatic potential addition
Eccentrically-located proton
Increase proton concentration near nano-channel wall
Increase proton transfer rate

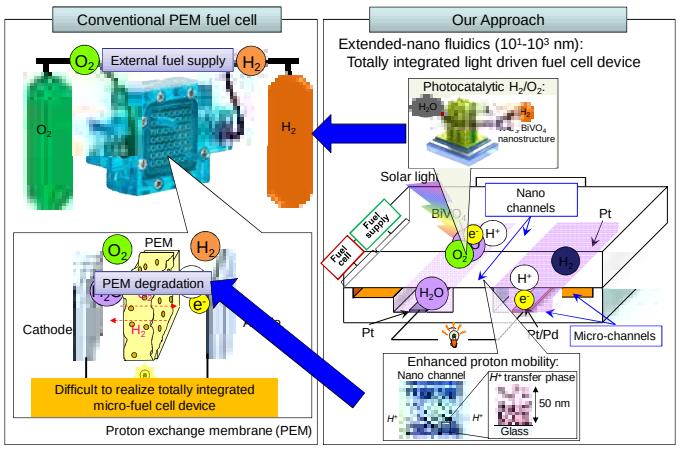
H^+ Diffusion Coefficient

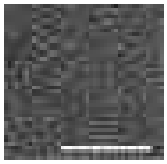
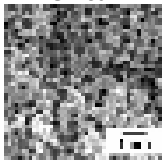
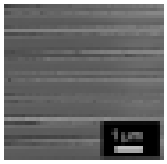
Device comparison: Nano-channels



1. Principle verification of a high efficient protons conductor device based on LN material
2. Verification of a proton transfer phase model

3. Comparison with the conventional Proton exchange membrane (PEM)



	Conventional PEM		Our Approach
	Nafion	Mesoporous Silica	Nano Channels
Material			
Degradation	Easily	No	No
Temperature	60-120℃	60℃	r.t.
Proton conductivity [10^{-2} S/cm^2]	0.8	0.6	1.3

4. Application

- Next generation portable self-powered energy device

5. Patent Licensing Available

Patent No.: WO2016/063537
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