

태양전지와 연료전지의 결합발전 시스템

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Abstract : As ideal new energy, solar cell has renewable and inexhaustible characteristics and the fuel cell only needs low maintenance and low operating cost. This paper introduces hybrid system of solar cell and fuel cell considering the advantages of stable and sustainable energy from the economic point of view. Then the paper shows the I-V characteristics of the solar module which are dependent on the power of the halogen lamp and the P-I and I-V characteristics of fuel cells which are connected in parallel and series.

Key Words : Solar cell, Fuel cell, I-V characteristics

1. Introduction

Economic and environmental concerns over fossil fuels encourage the development of new and clean energy [1]. Solar cell energy and fuel cell energy are new, clean and renewable energy. Solar cell is a kind of device which using the interaction of sunlight and materials to generate electrical energy [2]. Fuel cell is an electrochemical energy conversion device that combines hydrogen and oxygen in the presence of an electrolyte to produce electricity, water, and heat.

2. Experiment

Solar module:-	
Dimensions (width × height × depth):-	200mm × 297mm × 100mm ^o
Terminal voltage:-	2.2 [V] ^o
Short-circuit current:-	1200 [mA] ^o
Electrolyser:-	
Dimensions (width × height × depth):-	200mm × 310mm × 110mm ^o
Membrane surface area:-	25 [cm ²] ^o
Normal voltage in continuous operation:-	1.4-1.8 [V] ^o
Current:-	0-4000 [mA] ^o
Two-cell fuel cell:-	
Dimensions (width × height × depth):-	200mm × 297mm × 90mm ^o
Membrane surface area:-	2×10 [cm ²] ^o
Voltage when connected in parallel:-	0.4-1.0[V] ^o
Voltage when connected in series:-	0.8-2.0[V] ^o
Load module:-	
Dimensions (width × height × depth):-	100mm × 297mm × 100mm ^o
Selectable resistances:-	0.3/0.5/1/2/3/5/10/20/50/100 Ω ^o

3. Discussion

Fig.1 and Fig.2 show that when the DC current of the fuel cell increases, the voltage of fuel cell and variable resistor decreases.

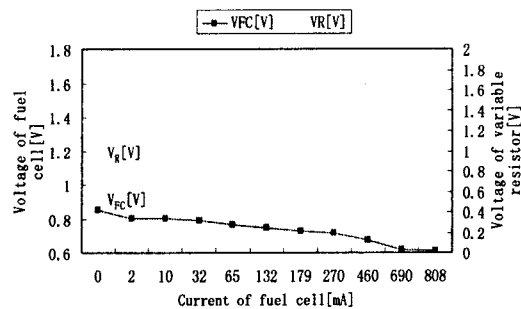


Fig.1 I-V characteristic curves of fuel cell and variable resistor when the two fuel cells are connected in parallel.

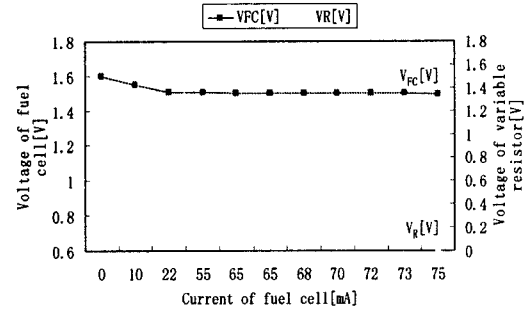


Fig.2 I-V characteristic curves of fuel cell and variable resistor when the two fuel cells are connected in series.

4. Conclusions

In this paper, it presents the hybrid system of solar cell and fuel cell. In this system, not only the solar cell generates the power, but also the fuel cell generates the power. The two new energies are clean. The fuel cell utilizes a part of the power which generated by the solar cell to generate power. What's more, the paper shows the I-V curves of the solar module which dependent on the power of the halogen lamp and the I-V characteristic curves of fuel cell which are connected in parallel and series. And the voltage of fuel cell and the voltage of the variable resistor decrease with the increasing of the current of the fuel cell in parallel as well as in series. In addition, the voltage of the fuel cells which are connected in parallel is less than the voltage of the fuel cells which are connected in series.

References

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