Review on the Recent Developments of Photovoltaic Thermal (PV/T) and Proton Exchange Membrane Fuel Cell (PEMFC) Based Hybrid System

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Abstract Photovoltaic Thermal (PV/T) system emerged as one of the convenient type of renewable energy system acquire the ability to generate power and thermal energy in the absence of moving parts. However, the power output of PV/T is intermittent due to dependency on solar irradiation condition. Furthermore, its efficiency decreases because of cells instability at high temperature. On the other hand, fuel cell co-generation system (CGS) is another technology that can generate power and heat simultaneously. Integration of PV/T and fuel cell CGS could enhance the reliability and sustainability of both systems as well as increasing the overall system performance. Hence, this paper intended to present the parameters that affect performance of PV/T and Proton Exchange Membrane Fuel Cell (PEMFC) CGS. Moreover, recent developments on PV/T-fuel cell hybrid system are also presented. Based on literates, mass flow rate of moving fluid in PV/T was found to affect the system efficiency. For the PEMFC, when the heat is utilized, the system performance can be increased where the heat efficiency is similar to electrical efficiency which is about 50%. Recent developments of hybrid PV/T and fuel cell show that most of the studies only focus on the power generation of the system. There are less study on the both power and heat utilization which is indeed necessary in future development in term of operation strategy, optimization of size, and operation algorithm.

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