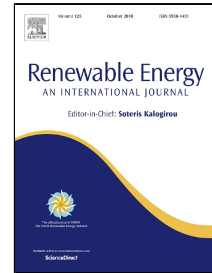


Accepted Manuscript

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PII: S0960-1481(18)30715-8
DOI: 10.1016/j.renene.2018.06.063
Reference: RENE 10219
To appear in: *Renewable Energy*
Received Date: 29 August 2017
Accepted Date: 16 June 2018

Please cite this article as: Seyyed Ahmad Hosseini, Ali M. Kermani, Akbar Arabhosseini, Experimental study of the dew formation effect on the performance of photovoltaic modules, *Renewable Energy* (2018), doi: 10.1016/j.renene.2018.06.063

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ABSTRACT

The performance of photovoltaic modules is related to climatic conditions. The aim of this study was to investigate the effect of dew formation on the performance parameters of two solar cell types including mono-crystalline silicon (mc-Si) and polycrystalline silicon (pc-Si) in the laboratory scale. The experiments were performed by using an environmental chamber equipped with a solar simulator based on LED light. The dew formation on the panel surface was conducted at three levels of 45, 60 and 75% and ambient temperature of 25°C. Based on the psychometric chart, the dew points temperature are 12.5, 8.5 and 4.5°C lower than 25°C corresponding to the relative humidity levels of 45, 60 and 75%, respectively. The percentages of the covering of dew on the module surface were estimated to be 45.19, 63.50 and 83.62% at relative humidity levels of 45, 60 and 75%, respectively. The performance parameters including the open-circuit voltage, short-circuit current, maximum power, maximum voltage, and maximum current were determined from the I-V and P-V characteristics curves for the humid air and dew formation conditions. Moreover, the output electrical power and the variations in relative efficiency were calculated. The results showed that the presence of dew on the surface of solar modules enhanced the photovoltaic performance parameters compared to humid air. For the mc-Si solar cell, at the dew formation condition with considering corrected the effect of temperature, the relative efficiency increased about 2.83, 3.13 and 4.06% the corresponding to the humid air conditions, while the values for pc-Si solar cell were 1.45, 3.26 and 4.39%. All photovoltaic performance parameters were decreased linearly by increasing the amount of dew covering on the module's surface.

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