Contribution ID: **166** Type: **Poster Presentation**

Infrared thermography of operational photovoltaic modules

Thursday, 12 July 2012 17:30 (2 hours)

Abstract content
   (Max 300 words)

Photovoltaic (PV) solar cells operating under outdoor conditions can lose up to 20% of its STC (Standard Test Conditions: 1000 W/m2, 25oC, AM1.5 Global Spectrum) rated power depending on its technological quality. This can have a detrimental effect on the effectiveness of a PV system which was designed at STC. It is therefore imperative to fully understand the behaviour of PV cells and modules operating under varying outdoor temperatures. Consequently, the aim of this study is to characterize the temperature dependence and heat dissipation of various PV technologies. Since different PV technologies respond differently to temperature variations, an indoor solar simulator was used to determine the effect of temperature on the performance parameters of PV cells and modules. Furthermore, these modules were deployed outdoors where temperature dependence and heat dissipation were monitored through infrared (IR) thermography. This IR thermographic analysis under operating conditions lends itself to be a diagnostic tool for defects on encapsulated modules since in most cases it can be observed as hotspots. This paper will present, analyze and discuss the temperature dependence, heat distribution of both photovoltaic and photochemical solar modules. Preliminary results indicate that the module quality is crucial to its dependence on temperature. The final paper will present the detailed results and relate the temperature dependence to defects and actual module quality parameters like saturation current (Io) and ideality factor (n).

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Yes

Level for award
 (Hons, MSc,
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MSc

Main supervisor (name and email)
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Prof E.L. Meyer

Would you like to
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Yes

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Session Classification: Poster Session

Track Classification: Track F - Applied Physics