Contribution ID: **81** Type: **Poster Presentation**

Temperature dependence of local breakdown voltages of crystalline Si Solar cells through voltage dependent ReBEL

In operation, photovoltaic (PV) modules can experience inhomogeneous shading. This can result in the reverse biasing of individual PV cells. This often results in local degradation of the device material as well as the encapsulant. This affects the performance of the entire module and therefore, the string of modules connected in series within a system. In this study, temperature-and-bias dependent reverse bias electroluminescence imaging (ReBEL) is utilised to generate a temperature dependent breakdown voltage map. This is used to identify specific breakdown types present in crystalline Si PV cells. It is important to understand the effect temperature has on the reverse bias characteristics of PV cells, due to the large variety of temperature conditions PV modules are operated in. Understanding the exact effect temperature has on reverse bias breakdown can improve selection criteria for end-users as it can influence the longevity of the complete PV module. This paper presents a method to determine the map of temperature coefficients of the breakdown voltages of various reverse bias breakdown mechanisms found in crystalline Si PV cells. The results and discussion of the method as applied to a multi-crystalline Si sample as well as that of a mono-crystalline Si sample will be presented.

Apply to be
 considered for a student
   award (Yes / No)?

Yes

Level for award
 (Hons, MSc,
   PhD, N/A)?

PhD

Primary author: Mr DIX-PEEK, Ross (NMMU)

Co-authors: Prof. VAN DYK, Ernest (Mandela University); Dr VORSTER, Frederik (NMMU)

Presenter: Mr DIX-PEEK, Ross (NMMU)

Session Classification: Poster Session 1

Track Classification: Track F - Applied Physics