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Publication date:
2017

Document Version
Publisher's PDF, also known as Version of record

Link back to DTU Orbit

Citation (APA):
New Light Source Setup for Angle Resolved Light Absorption measurement of PV samples

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Abstract—Here, we introduce measurements of angle resolved light absorption by PV cells, using broadband laser driven white light source with a bright, stable, broad spectral range and well collimated light.

Keywords—absorption; collimated; reproducibility; laser

I. INTRODUCTION

The light absorption of solar cells under working conditions is affected by several factors. In particular, this absorption effect of PV is studied with different type of light sources. In our set up we have used a new type of broadband light source. In their paper D. T. Reindl, W. A. Beckman, and J. A. Duffie studied the effect of diffuse irradiation as function of irradiation angle [1]. C Protogeropoulos and A Zachariou described reflectance characteristics of PV modules using a visible light source [2]. R. Santbergen and R.J.C. van Zolingen studied the effect of light absorption on the temperature of the PV modules [3]. In our case, we have built a set-up that allows automated, reliable measurements of the light absorption of solar cells as function of incidence angle with collimated light (with an angular divergence of about 0.1°). Hence, this set-up has many advantages, such as, the spectrum and intensity of the light source remain constant and high respectively throughout the test and the rotation stage can move easily and accurately with the given range of angles. The light source used here provides bright illumination across the UV-VIS-NIR range (190nm to 2100 nm) together with high spatial and power stability. Moreover, the light source is well collimated by collection optics to give a stable and reliable power measurement.

II. Methods

The whole measurement system consists of laser driven broad light source, rotation stage with a sample holder and current measurement transducer which is controlled by a LabVIEW controlled PC. The schematic diagram of the setup is shown in the Fig. 1. The UV filter was used just after the light source to remove the UV-C part for safety. The measurement room was kept at a temperature of 21°C using an air conditioning system.

REFERENCES