Compact multifunctional source-meter system for characterisation of laboratory-scale solar cell devices — DTU Orbit (08/08/2019)

This article presents an innovative and low-cost solution for optimizing the acquisition of performance data of small-laboratory-scale photovoltaic devices. A novel measuring setup is proposed, designed based on an Arduino microcontroller and low-cost components, coupled with open source hardware and software. The manuscript describes in detail the instrument design, components and assembly enabling the reproduction and customization of the instrument for any reader. The setup is combined with an optional web-platform, which enables fast analysis and comparison of the collected data. For the demonstration of the instrument in operation, comparison of measurements of solar cell with the developed setup and commercial products has been conducted. It is shown that the presented prototype provides values of accuracy and precision during I-V curve recording, comparable with the values measured using a commercial source-meter (Keithley 2400). The study also discusses the unique advantages of easy transport and data collection by the setup and the drawbacks in the hardware, which have been observed during a round robin study.

General information
Publication status: Published
Organisations: Department of Energy Conversion and Storage, Energy Research Centre of the Netherlands, Holst Center, Center for Energy and Environmental Chemistry Jena (CEEC), Universite Grenoble Alpes, National Physical Laboratory
Corresponding author: Gevorgyan, S. A.
Number of pages: 8
Publication date: 2019
Peer-reviewed: Yes

Publication information
Journal: Measurement Science and Technology
Volume: 30
Issue number: 3
Article number: 035901
ISSN (Print): 0957-0233
Ratings:
BFI (2019): BFI-level 2
Web of Science (2019): Indexed yes
Original language: English
Keywords: Characterisation, Advanced sensors, Arduino, Source meters, Photovoltaics, Electrical circuitry, Environmental measurements
DOIs:
10.1088/1361-6501/aafae4
Source: FindIT
Source-ID: 2442674189
Research output: Contribution to journal > Journal article – Annual report year: 2019 > Research > peer-review