Worldwide outdoor round robin study of organic photovoltaic devices and modules

Accurate characterization and reporting of organic photovoltaic (OPV) device performance remains one of the important challenges in the field. The large spread among the efficiencies of devices with the same structure reported by different groups is significantly caused by different procedures and equipment used during testing. The presented article addresses this issue by offering a new method of device testing using "suitcase sample" approach combined with outdoor testing that limits the diversity of the equipment, and a strict measurement protocol. A round robin outdoor characterization of roll-to-roll coated OPV cells and modules conducted among 46 laboratories worldwide is presented, where the samples and the testing equipment were integrated in a compact suitcase that served both as a sample transportation tool and as a holder and test equipment during testing. In addition, an internet based coordination was used via plasticphotovoltaics.org that allowed fast and efficient communication among participants and provided a controlled reporting format for the results that eased the analysis of the data. The reported deviations among the laboratories were limited to 5% when compared to the Si reference device integrated in the suitcase and were up to 8% when calculated using the local irradiance data. Therefore, this method offers a fast, cheap and efficient tool for sample sharing and testing that allows conducting outdoor measurements of OPV devices in a reproducible manner.

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