

REDUCING THE PHOTOVOLTAIC DEVICE R&D CYCLE



Using MOCON instruments, clients were able to reduce their photovoltaic R&D cycle, increasing productivity and speeding up time to market.

Challenge

Organic photovoltaic systems have undergone significant development in recent years. However, improving the lifespan of the devices remains a challenge.

Solar cells can be degraded by water and oxygen. Exposure to severe environmental conditions such as prolonged sunlight, high humidity, and heat generated by the device itself, undermines the quality and stability of the encapsulated system's barrier properties, the substrate, and the edge sealing used. It is imperative to accurately evaluate water vapor and oxygen transmission rates (WVTR/OTR) through the barrier during product development. Some tests must be conducted at high temperatures (e.g., 85°C) in accordance with the "damp heat test" portion of IEEE 1262 qualification specification for solar module exposure at 85°C and 85% RH for 1,000 hours.



COULOMETRIC SENSORS PROVIDE ACCURATE, QUANTITATIVE RESULTS

Alternative techniques such as calcium testing used in the photovoltaic industry may analyze different aspects of barrier qualities, but these WVTR measurements are usually qualitative, lack accuracy at very low levels, and/or they do not differentiate between oxygen and water permeation. Further, calcium testing takes a long time to generate results, causing R&D delays for photovoltaic manufacturers.

Solution

Using proprietary coulometric sensors, MOCON has been proven to measure WVTR down to $5 \times 10^{-5} \text{ g}/(\text{m}^2 \cdot \text{day})$ and OTR down to $5 \times 10^{-4} \text{ g}/(\text{m}^2 \cdot \text{day})$.

The absolute coulometric sensor measures each molecule of water vapor or oxygen that passes through the sensor, and requires no calibration. The response is linear throughout the entire measurable range of the sensor, so ultra-barrier material measurements are guaranteed to be highly accurate and repeatable.

Testing WVTR or OTR at elevated temperatures is possible using MOCON's instruments and remote diffusion cells designed to withstand these conditions in environmental chambers.

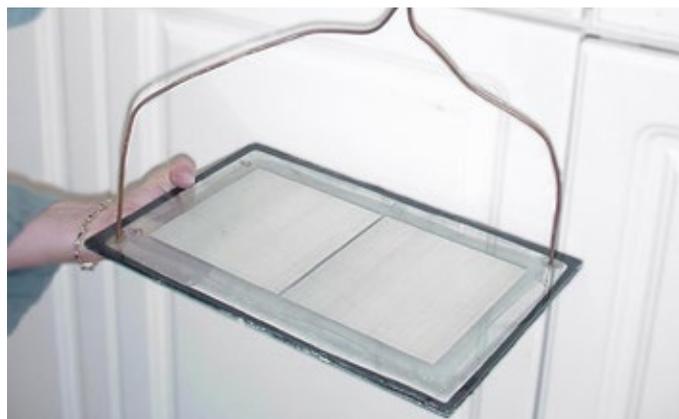
Benefits

The quantitative WVTR measurements that the absolute coulometric sensor provides are objective and much more accurate. Faster measurement results and increased throughput enable photovoltaic manufacturers to develop and launch perfected products more quickly than their competitors.

For more information on WVTR and/or OTR measurement, contact your MOCON representative.



Cells in a high temperature oven



Solar cell mock-up



Commercial solar panels



MOCON, Inc. North America is ISO 9001:2015 Certified
Certificate No: 216208-2017-AQ-USA-ANAB

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