SUNBOX: Low-cost solar simulator for the characterization of photodetectors and solar cells

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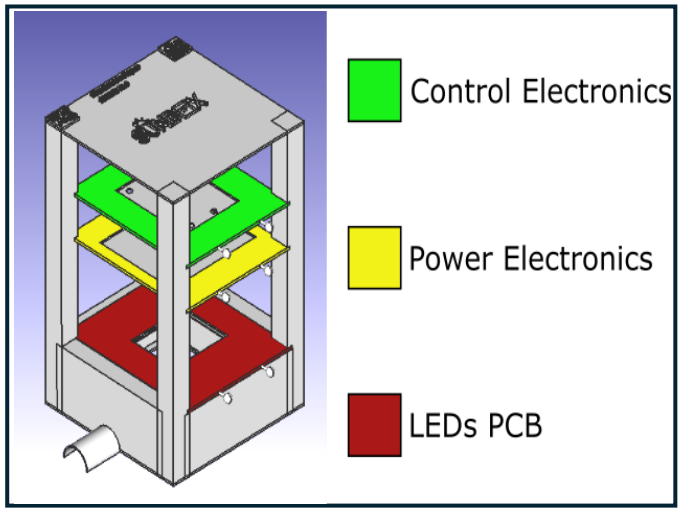
Summary/Characteristics

Researchers at the Universidad Carlos III de Madrid have developed an LED-based solar simulator that illuminates areas of up to 25 cm² from ultraviolet to near-infrared (360–1000 nm) to analyse and monitor the efficiency and degradation of solar cells, photodetectors, etc., on a small scale in an economical and reliable way. Therefore, the device is highly useful in R&D of materials for solar panels. It can also be useful in the textile industry, cosmetics and sunscreens, plant biotechnology, smart lighting, etc.

Innovative Aspects

- LED solar simulator with user-adjustable irradiation spectrum.
- Allows analysis of the efficiency and degradation of solar cells or other substrates on areas of up to 25 cm².
- Manufactured using 3D printing.
- Enables integration of the design with LEDs and spectrums specifically developed for this purpose.



Configuration of the SUNBOX device

Competitive Advantages

- Small size and easily portable.
- Customisable, with the option to select LEDs and modulate the irradiating light according to customer/user needs.
- More economical, faster and simpler production of the solar simulator, enabling product reproducibility and facilitating scale-up.
- No optical components or prior light handling required, making it more affordable than current solar simulators..
- Lower power consumption, longer lifespan and zoned system activation, representing substantial improvements over simulators using halogen or xenon lamps.
- Suitable for research use and pilot testing of photovoltaic cells, solar panels, light detectors and other environments requiring small-scale studies.
- Applicable to innovation sectors and industries where evaluating the effect of light on products under development is of interest.

Technology readiness level:

Ready for demonstration. Field tests carried out. TRL 7.

Intellectual and Industrial Property Status:

Spanish utility model granted ES1249534B1. Title: “Simulador solar para la caracterización de fotodetectores y células solares”.

Type of collaboration sought:

Licence agreements, joint ventures or manufacturing agreements are sought with industrial and research partners interested in evaluating the effect of light on their products and developments, photovoltaic cells, solar panels, etc.

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