

Spectral shaper illumination device

CSIC, through the Institute of Materials Science of Barcelona ICMAB, and ICREA have developed a new illumination device suitable for optical spectroscopic characterization of optical and/or optoelectronic materials and devices.

Industrial partners are being sought to collaborate through a patent license agreement.

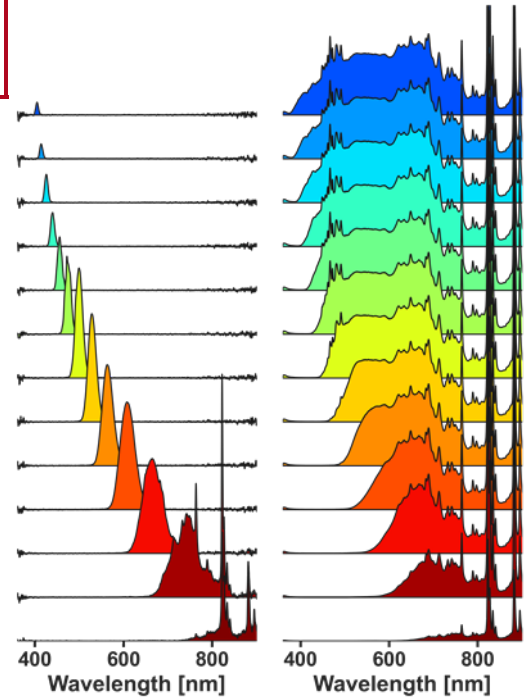
An offer for Patent Licensing

Illumination devices that tunes shape and intensity of light spectrum

In some applications, optical characterization may need a narrowband light source, while in others may need broadband illumination with a specific spectral distribution, and thus a plurality of pieces of equipment for a full characterization. For example, solar cell power conversion efficiency is characterized using a solar simulator with a broadband spectrum adjusted to outdoor sunlight or others, but external quantum efficiency is measured using monochromatic wavelength illumination.

We present an innovative device that provides a tunable, focused, spectrally split beam, modulated in intensity and in a wavelength range with respect to the incoming light source. With this new device all the characterizations of optical and optoelectronic devices can be done with a single apparatus.

The apparatus works by spectrally splitting a broadband incoming light beam into its spectral components, using special prisms and custom made mirrors; then the beam passes a spatial filter stage which modifies the intensity of each color separately; finally, the beam is condensed again providing either a rainbow spot (spatially separated colors) or a homogeneous spot with the desired spectrum at all loci.



Two examples of output spectra for different settings of the filtering stage: (left) narrow wavelength band-pass configuration and (right) long-wavelength pass configuration.

Main innovations and advantages

- All-in-one compact device that makes different types of photovoltaic characterization possible that currently must be done with different apparatus, including power conversion efficiency, external quantum efficiency, recombination or indoor efficiency measurements.
- Highly tunable light spectrum (spectrum on demand): from broad band (e.g. AM 1.5) to narrow band (up to FWHM of ca. 10 nm).
- Fast, computer aided modification of the spectrum.
- Enable novel characterization modes, such as optimization of tandem solar cells, advanced stability testing, etc.
- For applications in photovoltaic technologies, but also in solar thermal applications, photocatalysis, light degradation studies in materials, etc.

Patent Status

Patent application filed and suitable of international extension

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