Leibniz Ferdinand Braun Institut

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Broadband UV LEDs – novel sources for UV spectroscopy

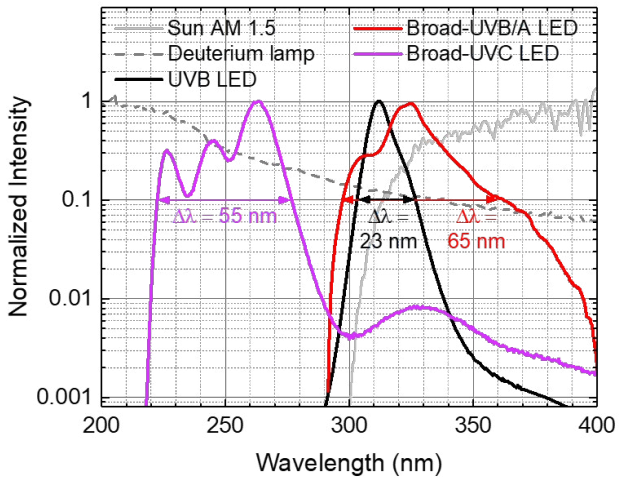
The Ferdinand-Braun-Institut develops and produces AlGaInN-based light emitting diodes (LEDs) operating in the ultraviolet (UV) spectral region. Our conventional UV LEDs emit monochromatic light with peak wavelengths between 225 and 340 nm. Development efforts focus on device optimizations that enable both high efficiency and a long operational lifetime. For example, our UVB LEDs deliver output powers exceeding 40 mW and exhibit lifetimes of several thousand hours.

Development of broadband UV LEDs

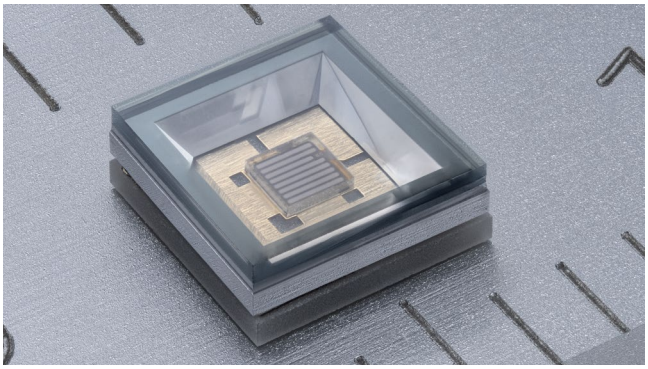
Newly developed broadband UV LEDs use a novel semiconductor layer structure that differs from our conventional LED designs. Instead of emitting at a single wavelength, these broadband UV LEDs emit light across a broad spectral range (possible range: 220-400 nm). A successful proof of concept has demonstrated emission spanning the UVC (222-277 nm) and UVB/A (297-362 nm) spectral regions.

The LEDs are mounted in our standard package, which is compact, durable, and designed for demanding environments. Moreover, they can be targeted to the desired spectrum shape. With their broadband emission, they offer a sustainable alternative to traditional broadband sources like deuterium- and mercury-based lamps.

The Institute is keen to work with partners to further develop broadband UV LED technology for specific applications.



Normalized emission spectra of different light sources in comparison with broadband UV LEDs.



UV LED chip (1x1 mm2) in a hermetic SMD package.

Advantages

- broadband spectrum from a point light source simplifies polychromatic light coupling into optical systems (e.g. fiber)
- switches on instantly without the warm-up phase of several minutes required for gas discharge lamps
- more compact and robust than gas discharge lamps (interesting for mobile applications)
- enable more economic measurement setups

Profile

The Ferdinand-Braun-Institut, Leibniz-Institut für Höchstfrequenztechnik (FBH) researches electronic and optical components, modules and systems based on compound semiconductors. In the field of III-V electronics, it manufactures high-frequency devices and circuits for communications, power electronics, and sensor technology. Moreover, FBH develops light sources from the visible to the UV spectral range: high-power diode lasers, UV light sources, and hybrid laser systems. Applications range from medical technology, materials processing and sensors to optical communications in space and integrated quantum technology. In close cooperation with industry, its research results lead to cutting-edge products.

The institute is a member of the Leibniz Association and part of Research Fab Microelectronics Germany (FMD).