TECH OFFER

Long-Life, Broadband and Heat-Free Near-Infrared (NIR) Light Source

KEY INFORMATION

TECHNOLOGY CATEGORY:
Electronics - Lasers, Optics & Photonics
Healthcare - Diagnostics
Foods - Quality & Safety

TECHNOLOGY READINESS LEVEL (TRL): TRL4
COUNTRY: SINGAPORE
ID NUMBER: TO175066

OVERVIEW

Near-infrared (NIR) light, part of the electromagnetic spectrum just beyond visible light, has various applications, particularly in vital sensing and food analysis. However, existing technologies for generating NIR light present certain limitations. Traditional halogen lamps can emit a continuous spectrum from visible to NIR wavelengths but pose challenges such as considerable heat generation, short lifetime, and difficulties in light distribution control. As a modern alternative, near-infrared LED arrays offer advantages such as no heat radiation and long lifespan. However, they are not suitable for applications requiring a wide wavelength range due to a lack of continuous output across the entire NIR spectrum. The wavelength intensity variation of NIR-LED arrays also affected the consistency of sensing and analysis.

To overcome these challenges, the technology owner has developed a unique NIR phosphor as a heat-free light source with a wide spectrum range, enabling degradation-free analysis. Especially in food analysis, prolonged exposure to a halogen lamp may damage food. In addition, the long lifetime of this NIR source reduced the need for frequent replacements, leading to cost

savings. Moreover, it can irradiate broadband NIR light from a single source, enabling easy light distribution control and wavelength axis alignment and reducing wavelength intensity variation within the irradiation plane. These advantages ensure consistency and accuracy in sensing and analytical applications.

The technology owner is seeking R&D collaborations with industrial partners interested in integrating this advanced NIR light source into their applications.

TECHNOLOGY FEATURES & SPECIFICATIONS

Compared to conventional near-infrared LED light sources, this NIR light source has a broader spectrum width, making it more suitable for spectroscopic measurements, especially those using multiple wavelengths. Key features of this technology are:

- Wideband spectrum: 450nm to 1000nm (over 1000nm is under development)
- Output: approximately 3W per module
- Adjustable spectral shape and light distribution angle to meet different needs
- Easy light focusing control and uniform wavelength intensity on the irradiation surfaces
- Long product life: 40,000 hours (LED chip guaranteed time), 40 times longer than typical lifespan of halogen lamps
- Minimal accuracy loss due to temperature changes: output drops by 8% only when the temperature increases from 25°C to 75°C, compared to a 27% drop of other products

POTENTIAL APPLICATIONS

This unique near-infrared light source can be widely applied to night vision, non-contact vital sensing, food analysis, medical diagnosis, agricultural analysis, and other fields. Potential applications include (but are not limited to):

- Night vision: surveillance camera, traffic monitoring system, etc.
- Non-contact vital sensing: health monitoring (heart rate, oxygen saturation), self-health care, etc.
- NIR spectroscopy: foreign matter inspection, fruit and vegetable analysis, internal quality check, fresh food quality control, etc.
- Fluorescence imaging: endoscope, fundus camera, etc.

UNIQUE VALUE PROPOSITION

- Wide wavelength range and adjustable spectral shape
- No heat generation: enable degradation-free analysis
- Long product life: reduce maintenance frequency and costs
- Enhance the consistency and accuracy of sensing and analysis