

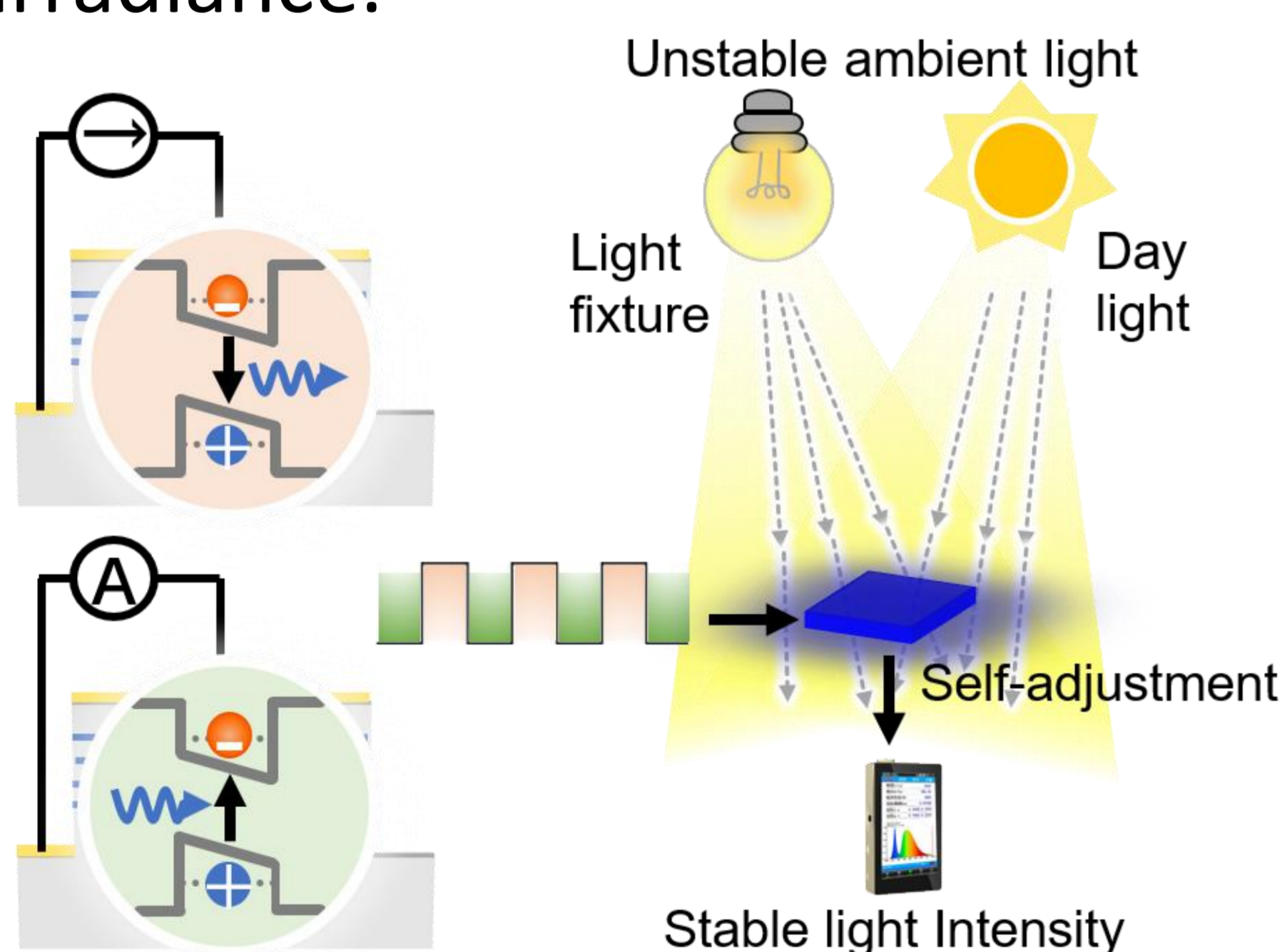
# Self-adjusting light source based on a dual-function GaN light-emitting diode

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## Abstract

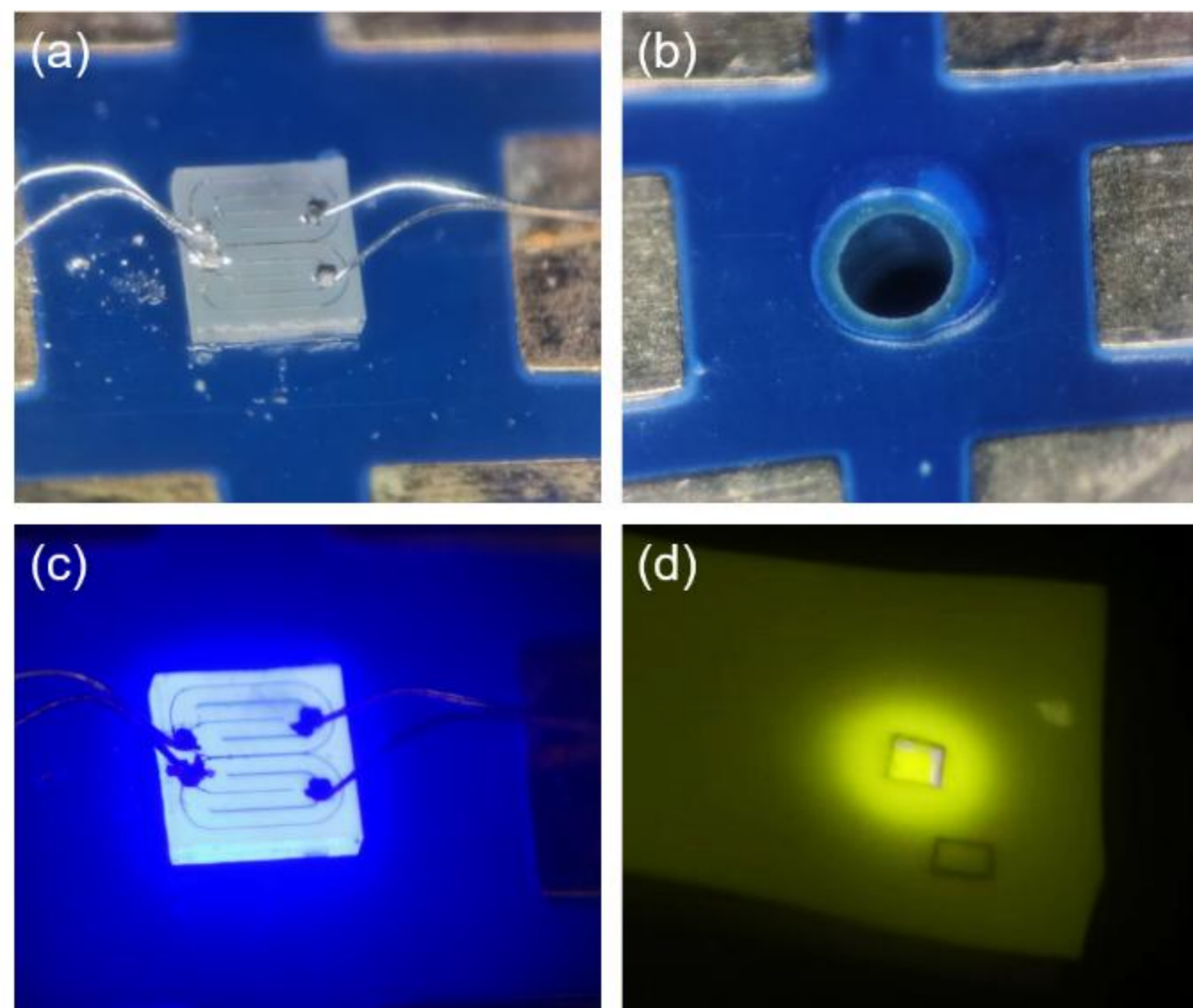
- A simple and elegant approach based on a single GaN LED that can self-adjust the output intensity in response to the changes in ambient intensity.
- The GaN LED with InGaN/GaN multiquantum wells can operate in both luminescence and photodetection modes.
- Driven by a microcontroller board under pulse-width modulation, the device acts as a detector to provide photocurrent signals that reflect the ambient light intensity at the off state, and provides the desired intensity level at the on state.
- Exhibit a proof-of-concept demonstration of real-time stabilization of blue and white light irradiances at target areas despite large variations in ambient irradiance.



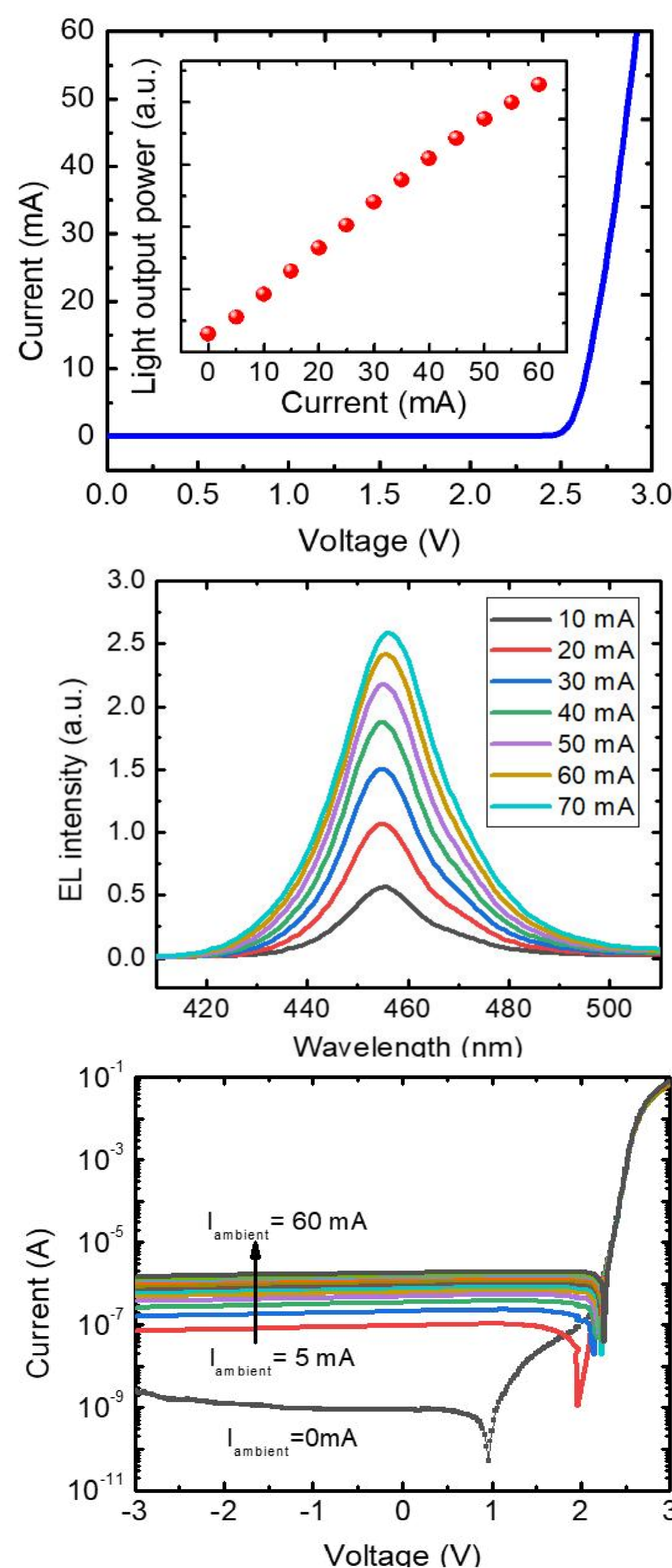
## Devices and fabrication

- Epitaxial growth: an epilayer structure composed of undoped GaN, Si-doped n-GaN, InGaN/GaN multi-quantum wells (MQW), and Mg-doped p-GaN, on a 4-inch sapphire substrate.
- Photolithography, etching, and metal evaporation.
- Printed circuit board (PCB): a drilled hole smaller than the LED.

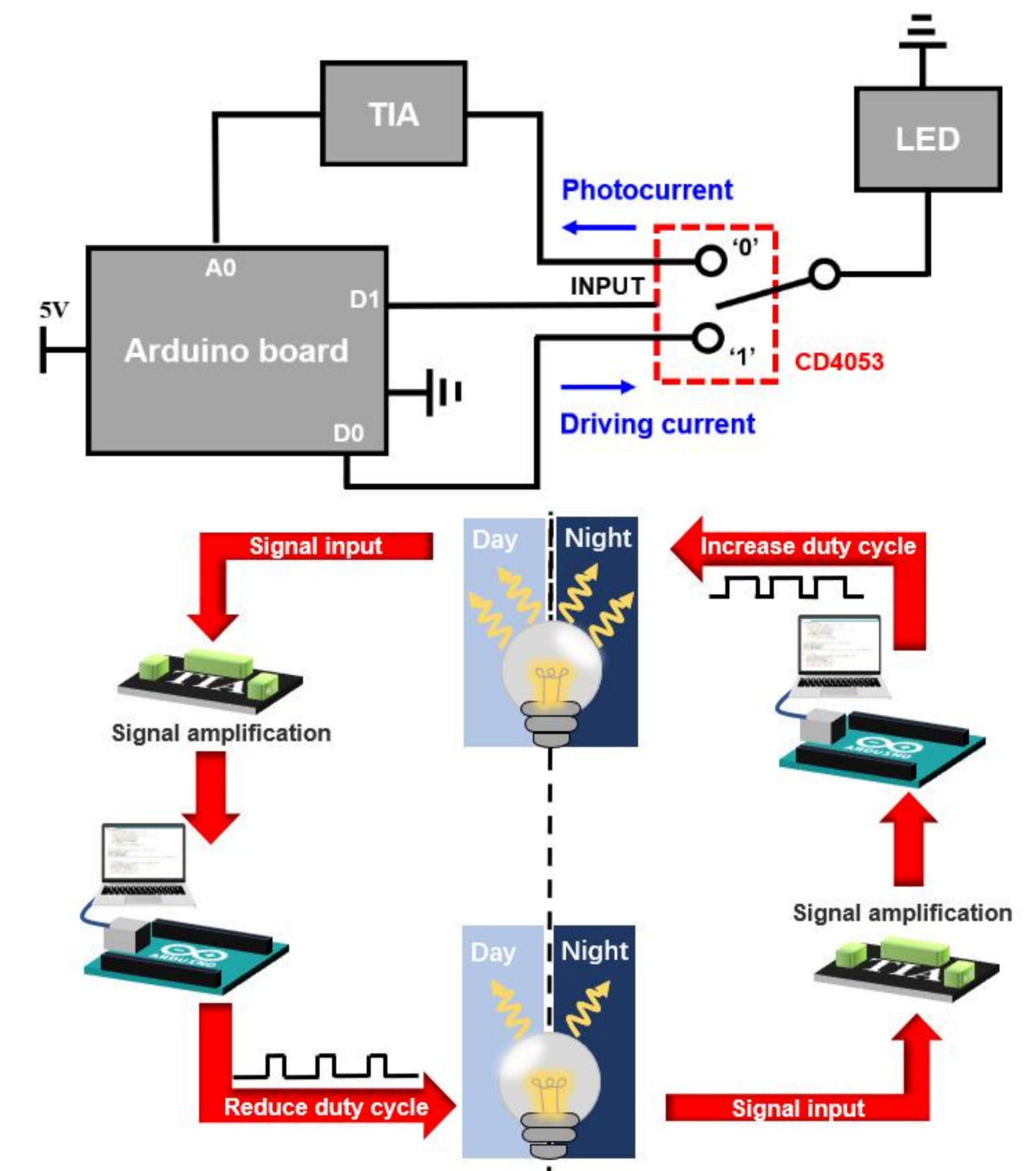
- The LED die is attached and wirebonded to a PCB



## Characterization of LED

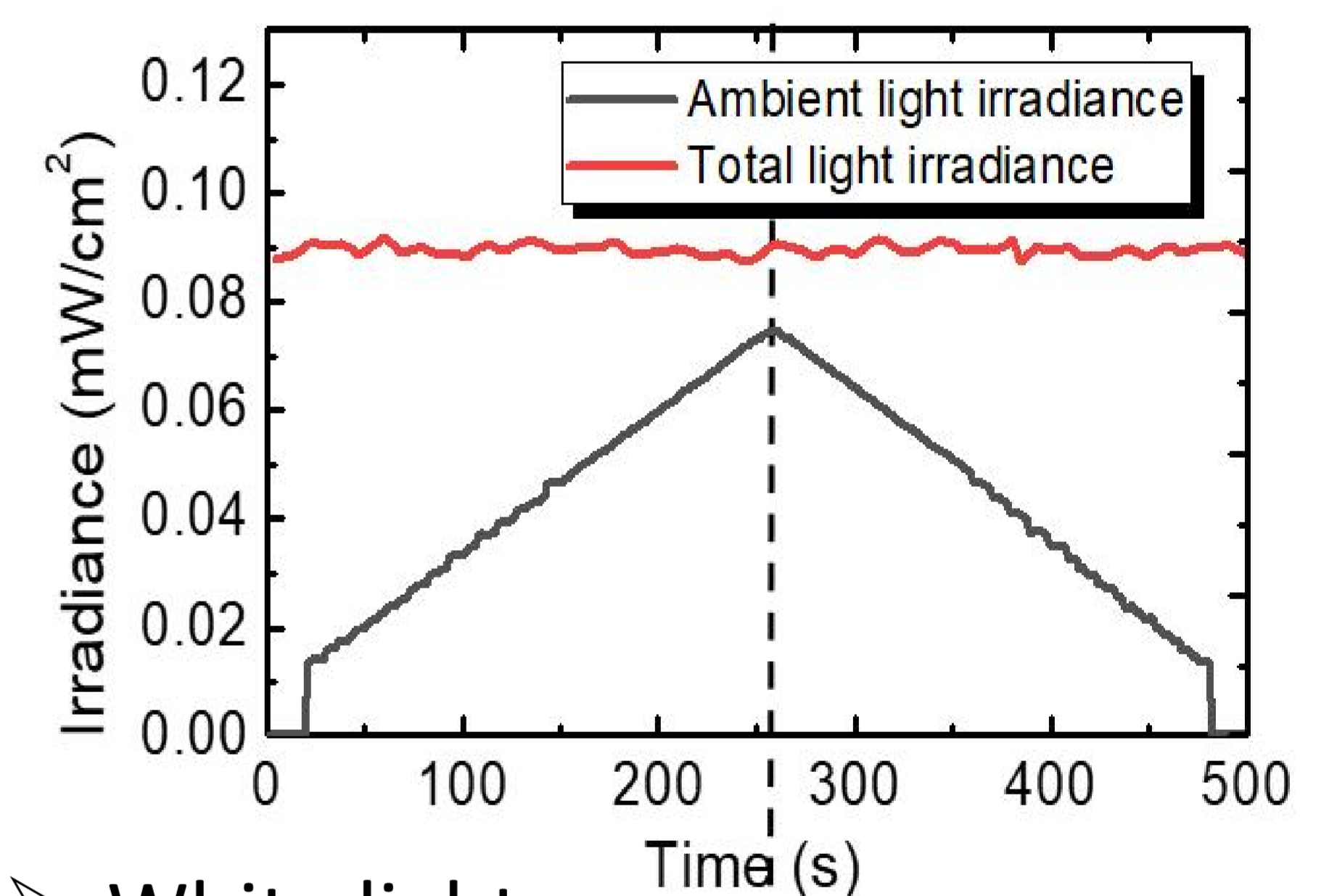


## Methods

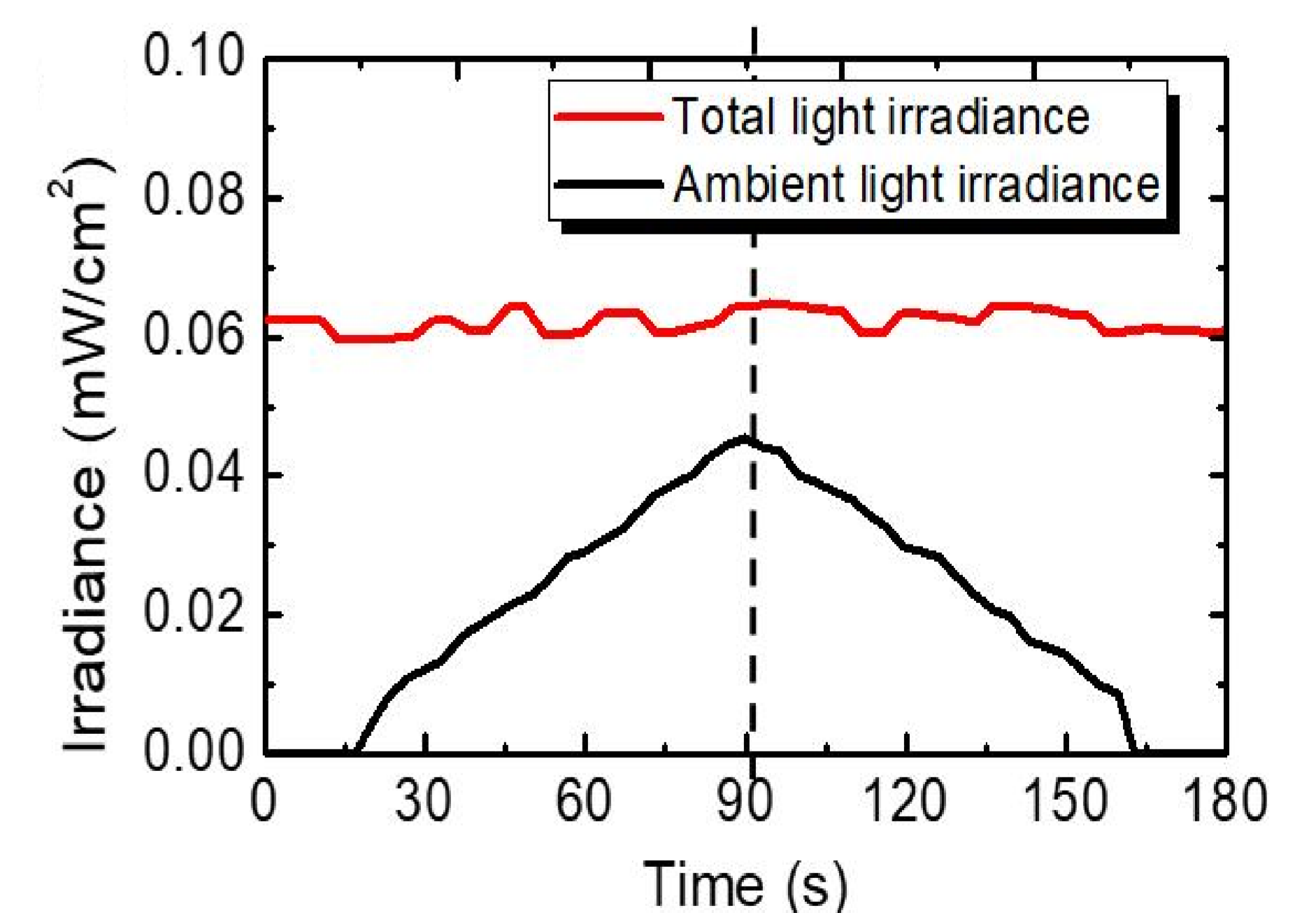


## Results

- Blue light:



- White light:



## Conclusion

A self-adjusting light source based on a GaN LED operating in PWM mode has been demonstrated.

### Acknowledgement:

- College Students' Innovative Entrepreneurial Training Plan Program under Grant 2020X65;
- Special Funds for the Cultivation of Guangdong College Students' Scientific and Technological Innovation ("Climbing Program" Special Funds.) under Grant pdjh2021c0070.