

# Blue TADF emitters for OLED with high external quantum efficiency

## SUMMARY

We propose innovative blue TADF emitters for OLEDs with high external quantum efficiency and low efficiency roll-off. Deep blue emission under 460 nm makes these emitters suitable for commercial OLED display applications.

## BACKGROUND

Organic light-emitting diodes (OLEDs) represent one of the most attractive technologies for large-area ultrathin displays and lighting applications as they offer high luminous efficacy and contrast ratio in addition to mechanical flexibility, low weight, and cost- and power-efficiency. Recently, thermally activated delayed fluorescence (TADF) has become a widely researched phenomenon that is exploited for fabrication of highly efficient OLEDs. While high-performance red and green OLEDs already exist, there is a performance deficiency in the area of blue light, which holds back wide adoption of this technology in the industry.

## TECHNOLOGY

To increase the efficiency of blue light TADF OLEDs, we developed series of naphthyridine- or benzophenone-based blue light emitters. Emitters are able to reach deep-blue emission (down to 452 nm) and external quantum efficiency up to 17.6 % [1] or sky-blue emission (down to 481 nm) with a very high external quantum efficiency of 24.6 % [2]. OLEDs with our developed blue TADF emitters, also demonstrate low efficiency roll-off, which is very important for industrial application.

The developed emitters are suitable for both vacuum and solution processing of OLEDs. Vacuum processing gives better efficiency results, however, solution processing offers scalable manufacturing, simplified and low-cost fabrication as well as the possibility to produce large-area devices.

The same technology could be implemented on a flexible substrate to get flexible OLEDs with efficient blue TADF emitters.



## TECHNOLOGY READINESS LEVEL

1 2 3 4 5 6 7 8 9 Validated in lab

## INTELLECTUAL PROPERTY

Technology developed at Vilnius University.

## PUBLICATIONS

[1] [Realization of deep-blue TADF in sterically controlled naphthyridines for vacuum- and solution-processed OLEDs.](#)

[2] [Suppression of benzophenone-induced triplet quenching for enhanced TADF performance.](#)



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## BENEFITS

- Deep blue light emission (<460 nm) is suitable for commercial OLED display applications.
- High external quantum efficiency – up to 24.6 %.
- Low efficiency roll-off.
- Blue TADF emitting material is suitable for solution processing, which offers scalable manufacturing, simplified and low-cost fabrication as well as the possibility to produce large-area devices.

## APPLICATION

Blue TADF emitters are designed for OLED applications, which could be used in:

- Devices with displays (e.g., TVs, laptops, smartphones, digital cameras, VR headsets, tablets, etc.)
- OLED panels;
- Curved OLED devices and displays;
- Rollable and foldable devices with OLED displays;
- Transparent OLEDs embedded in windows or car windshields;
- General lighting.

## CONTACTS

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