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Project consortium:



Heavy metal free emitters for
new-generation light sources

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Project description

Funded by the European Commission Horizon 2020 Framework Programme, the MEGA project is a four-year (2019-2022) research and innovation collaboration between European and International partners, coordinated by KTU.

Organic heavy metal free fluorescent materials show exceptional potential for use in new-generation light sources, such as organic light-emitting devices (OLEDs) and organic lasers. It is anticipated that these new materials will enable organic electronic devices to be constructed with higher efficiency, simpler device structures, lower fabrication costs, and reduced environmental impact.

In the frame of the project, two types of organic electroactive materials will be studied :

- (1) Fluorescence materials exhibiting thermally activated delayed fluorescence (TADF) for use in OLEDs in displays and lighting devices .
- (2) Fluorescent materials with low thresholds for amplified spontaneous emission (ASE) for use in organic lasers in spectroscopy and telecommunication.



Objectives

To develop the new materials, four scientific and technical objectives will be targeted over the course of the project:

- (1) Screen compounds with TADF or lasing properties by means of molecular modelling,
- (2) synthesise most promising compounds with TADF or lasing properties,
- (3) characterise most promising compounds with TADF or lasing properties
- (4) test materials in device structures to meet industry requirements.

Challenges

In preparation of these materials for commercial industrial use, MEGA will need to overcome the following challenges, including:

- Theories explaining TADF and ASE are still in their infancy.
- Organic material samples need to be extremely pure (>99.5%). Consequently, new synthesis routes need to be developed.
- TADF emitters for OLEDs have lifetimes falling short of industry requirements.
- Fluorescence emitters for lasers need high available optical gain, solution processability and narrow emission spectra with high efficiency.
- Properties of TADF and lasing materials are very sensitive to structural changes.

Expected impacts

The objectives of the MEGA project will be carried out by the consortium partners through a series of staff exchanges, sharing knowledge and strengthening their expertise in the related field. MEGA will play a significant role of creating impact in two areas:

1. Enhancing the potential and future career perspectives of the staff involved, though several activities such as joint research and knowledge transfer from training workshops and research training exchanges;
2. Developing new and lasting research collaborations, achieving transfer of knowledge between participating organisations and contribution to improving research and innovation potential at the European and global levels

