New paradigms for high efficiency blue emitters for white OLEDs

Feb 2015 – Jan 2018

www.h2020-phebe.eu

This project has received funding from the EU's Horizon 2020 research and innovation programme under grant agreement No 641725

Rationale

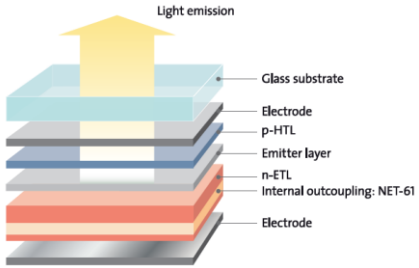
Two key issues prevent current iridium-based, phosphorescent OLED emitters from gaining a major fraction of the world lighting markets:

- Iridium is the fourth rarest naturally-occurring element on the planet, so basing a large-scale, high-volume lighting industry on this resource is risky as well as detrimental to the environment.
- Iridium-based blue phosphor devices have short working lifetimes and low energy efficacy that are well-below industry expectations.

Recent research by Durham University on intramolecular charge transfer systems that enable TADF (ICT-TADF) and intermolecular exciplex charge transfer systems that enable TADF (Exciplex-TADF) has demonstrated very promising improvements in energy efficacy. Moreover, the novel molecular systems do not use iridium.

Overall Objective

Create innovative, high-efficiency, blue emitters for white OLEDs, which will create a major breakthrough in the cost performance and environmental-friendliness of OLED lighting.

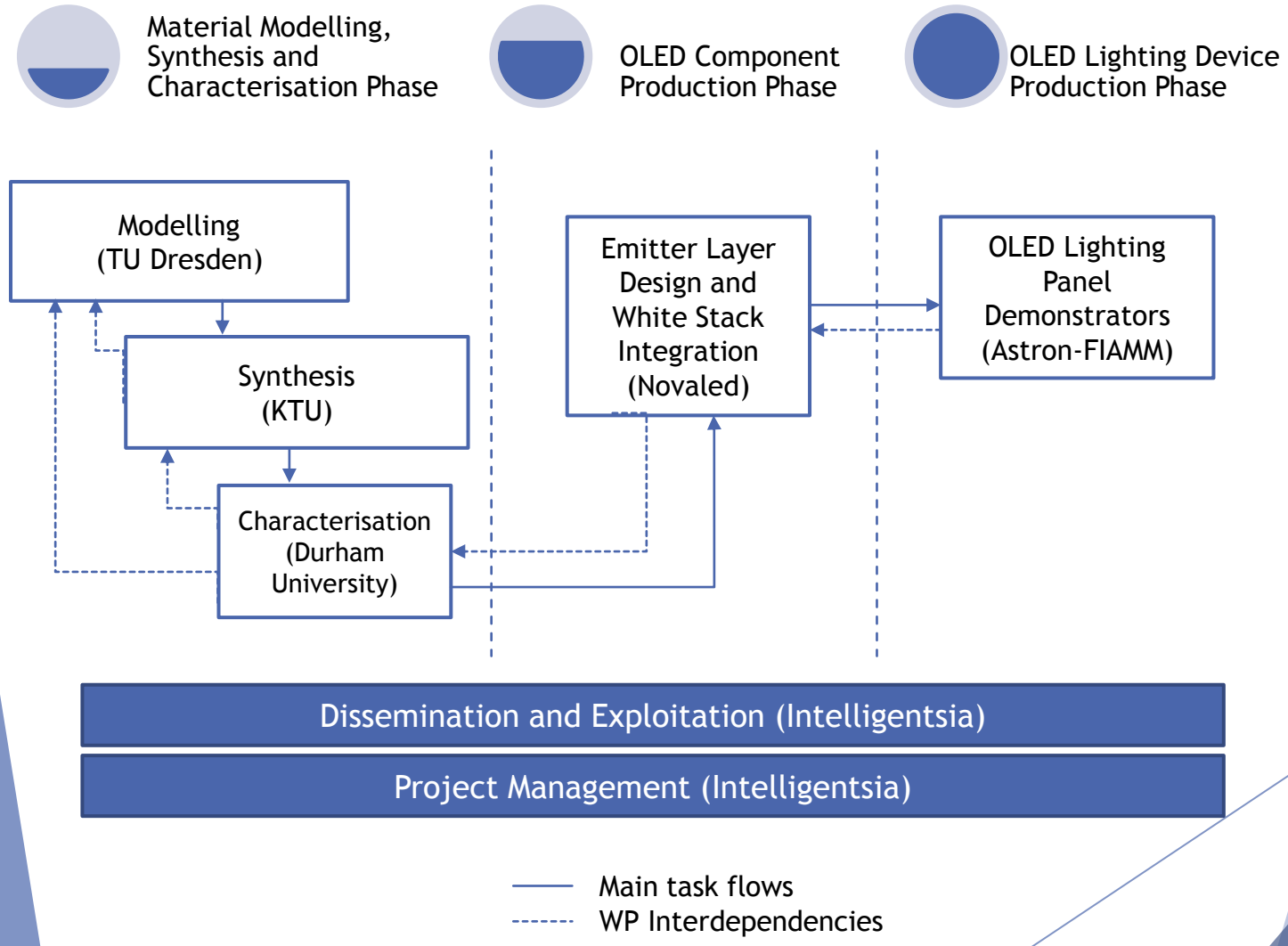


- Develop thermally activated delayed fluorescence materials without iridium
- Design new high-efficiency blue emitters
- Produce novel white OLED lighting systems

Scientific and Technical Objectives

Objective 1	• Screen potential ICT-TADF and Exciplex-TADF compounds with theoretical models
Objective 2	• Synthesise the most promising ICT-TADF and Exciplex-TADF model compounds
Objective 3	• Characterise and select the best ICT-TADF and Exciplex-TADF synthesised compounds
Objective 4	• Design white stack units employing selected TADF based emitter and block materials
Objective 5	• Design close-to-production OLED lighting panel demonstrators

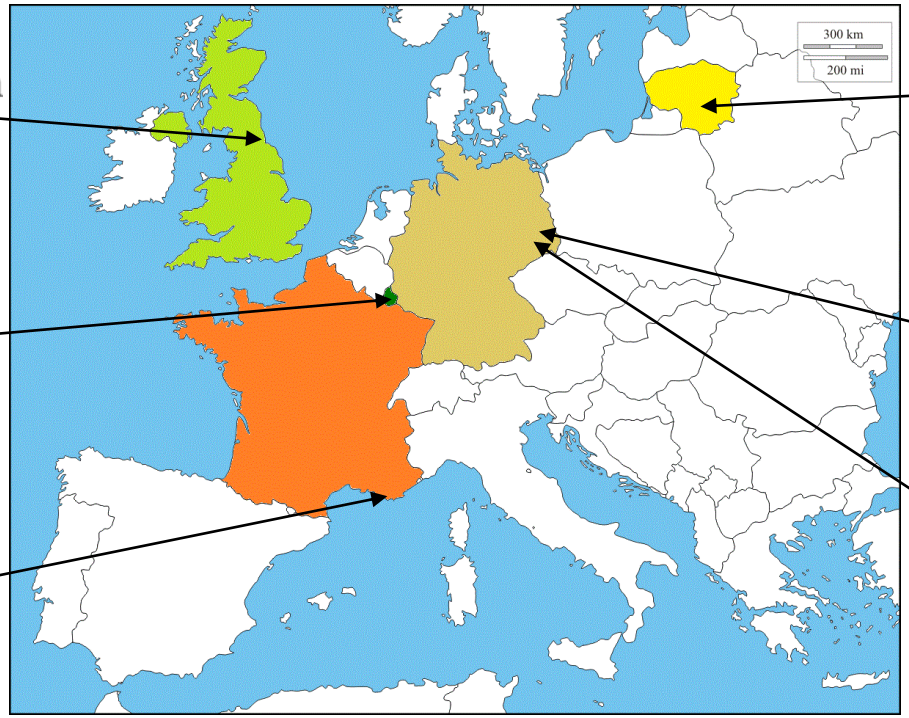
Work Plan


Material Modelling, Synthesis and Characterisation Phase
OLED Component Production Phase
OLED Lighting Device Production Phase
Modelling (TU Dresden)
Synthesis (KTU)
Characterisation (Durham University)
Emitter Layer Design and White Stack Integration (Novaled)
OLED Lighting Panel Demonstrators (Astron-FIAMM)
Dissemination and Exploitation (Intelligentsia)
Project Management (Intelligentsia)
Main task flows
WP Interdependencies

Expected Impacts

- Cost performance breakthroughs - lighting systems with production costs of 1€/100 lm
- Secured and reinforced industrial technology leadership and substantially increased market presence in lighting
- Improved business opportunities and value creation in Europe in lighting by reinforced cooperation along the value chain

Consortium



Durham University

intelligentsia consultants

Astron FIAMM

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- Subscribe to the PHEBE newsletter via the project website: www.h2020-phebe.eu

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