1st RoLA-FLEX press release, April 2021

The EU-funded RoLA–FLEX project is an industry driven project providing innovative solutions to the challenges associated with performance and lifetime of existing Organic and Large Area Electronics (OLAE). OLAE advancements have offered the potential of creating new and sustainable manufacturing sites in Europe, with significantly less toxic waste produced during the process. Despite the advancements of OLAE the use of organic semiconductors has not yet revolutionized consumer electronics and alternative energy related sources. The current wider market penetration of OLAE is blocked by scientific and engineering challenges to be overcome. The RoLA-FLEX project addresses these challenges by focusing on:

- Solution processed organic and inorganic electronic materials designed according to the end-user requirements;
- Innovative OLAE manufacturing processes, by seamlessly introducing laser printing, sintering and patterning in OLAE process lines
- Demonstration of two TRL5+ OLAE prototypes: 1) a smart energy platform for IoT devices powered by OPVs, 2) a next-gen smart watch incorporating a flexible OLCD.

The RoLA-FLEX consortium has recently completed the introductory Work Package on "Specifications and confirmation of end-users' requirements". The purpose of this effort was to specify the performance requirements for both end-applications involved in RoLA-FLEX and to translate them into specifications for both device and system-levels.
The RoLA-FLEX's consortium has concluded all the specifications necessary for the demonstration of the two OLAE prototypes. Their innovative features will be enabled by the high-performance materials and the laser digital processes developed within the project:

Use case 1: The development of an indium tin oxide (ITO)-free, flexible Organic PhotoVoltaic (OPV) prototype for the powering of a smart energy platform used in IoT environment. The Laser printing of inks comprising single crystalline silver or copper nanoparticles, will form highly transparent and conductive metal grids on flexible substrates to replace ITO as the bottom electrode. The module scribing and interconnections will be carried out as a laser-based, back-end interconnection step following the Roll-to-Roll deposition of all the functional layers. High power conversion efficiency will be achieved by employing solution processed metal oxide inks as buffer layers offering optimal electronic match with the active materials, which will be mixed non-fullerene acceptors with donors. The OPV modules of free-form designs will be integrated in a smart platform to power IoT devices in the context of smart city applications.

Use case 2: OLCD/OTFT display prototypes and their application in wearable smart watches. Within the project, we will employ high-resolution, laser digital processing of metal nanoparticle inks, to integrate flexible Organic Thin Film Transistor source and gate driver chips into an Organic Liquid Crystal Display (OLCD). We will thus develop TRL5+ OLCDs offering near bezel-less form factors. They will rely on organic semiconductor materials with record hole mobilities, which will enable high-resolution and long environmental stability. These OLCDs will be integrated in a next generation smart watch with near zero bezel design, lightweight form factors, offering robustness and flexibility, involving mostly low-cost, solution -processed materials.

The RoLA-FLEX project has organised two meetings with its External Advisory Board (EAB). At the last meeting in March 2021, the results of the work on “specifications and end-users’ requirements” has been presented and the resulting feedback will encourage additional activities in the project.

RoLA-FLEX is bringing together a diverse, multi-disciplinary and complementary team that enables it to support European industry with new disruptive knowledge which will be implemented through their products and services and will allow them to expand know-how to other markets as well, such as smart homes and automobiles.

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