FLOIM, improving mobile and another electronic device technology

New automatized manufacturing technology enabling optical assembly of optoelectronics in many solutions (light management, lighting, display, sensing, high quality holography and imaging, etc.)

Improving the cost efficiency, flexibility and environmental footprint of the complete integrated optoelectronics workflow, can provide European industry with a key tool for excelling in advanced applications and differentiating their products, while keeping production, innovation capacity and key IP in Europe.

In this context, FLOIM will develop an automated process for optical assembly of optoelectronic devices, based on optical quality injection overmoulding. Freeform and microstructured optical surfaces are generated directly on the components through thermoplastic microreplication, using microstructured inserts. The technology aims to simplify the assembly routes for heterogeneously integrated optoelectronics, with drastic cost reduction, high productivity and improved device performance.

Contribution to European photonics industry

The manufacturing solution developed in FLOIM will contribute to improve competitiveness of European photonics industry at large, generating growth and jobs, creating new market opportunities for optoelectronic device manufacturers and enabling the manufacturing of innovative products for many solutions (light management, lighting, display, sensing, high quality holography and imaging, etc.).

FLOIM has the potential for a relevant impact in photonics and optoelectronics industry and its applications at large. Estimations based on current markets status leads to a potential impact of FLOIM, when adopted by manufacturing industry, generating up to 5,200 jobs and an additional market share of €1,195M for EU companies in the sectors tackled by the project.

FLOIM in citizens daily life

FLOIM will enable highly advanced innovations for European key sectors like manufacturing, communication and information, healthcare, transport, energy… radically improving and creating new functionalities to respond to their market's needs. FLOIM will also contribute to enhance people's life quality boosting digital connectivity and enabling efficient and comfortable mobility. Indeed, within the project, the technology will demonstrate its viability to deliver the following new or improved products and services:

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European consortium

FLOIM consortium is composed by 12 entities from seven EU countries. Namely, it counts with five research centres: AIMEN Technology Centre (Spain), CEIT-IK4 (Spain), FRAUNHOFER-IWU (Germany), RECENDT - Research Center for Non Destructive Testing (Austria) and UPC - Universitat Politècnica de Catalunya (Spain); as well as with four technology suppliers: ADAMA INNOVATIONS (Ireland), MASSO - MONDRAGON ASSEMBLY (France), PROMOLDING (Netherlands) and SNELLOPTICS (Spain). Finally, three end-users close the consortium: FAGOR AUTOMATION (Spain), FLEXENABLE (UK) and HYBTRONICS MICROSYSTEMS (Spain).

End-users (FAGOR, FLEXENABLE and HYBTRONICS) define the products that will demonstrate FLOIM technology, while SNELLOPTICS is in charge of the optical design of such products. AIMEN, CEIT, FRAUNHOFER-IWU and ADAMA are working with advanced manufacturing technologies, such as multiphoton polymerization, direct laser machining, high accuracy micromilling and Ion-Implant Lithography, in order to develop tooling able to provide optical functionalities by injection moulding, process handled by PROMOLDING and UPC. ADAMA, FRAUNHOFER-IWU and RECENDT are developing complete control and monitoring systems of the injection moulding process, and MASSO leads the integration of the individual developed modules into a manufacturing pilot line that will serve as a test benchmark for the FLOIM technologies.

In FLOIM, the role of RECENDT is to act as work package leader for work package 4, dealing with Sensors, Inspection and Machine Intelligence for the new overmoulding production systems, as well as developing new in-mould sensors.

RECENDT has long experience in developing customized in-line process and product monitoring solutions. Within FLOIM we will do research to make it first-time possible to measure the product quality directly during the injection moulding process.

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First, this includes to determine the correct position of the inserted electronics part. Positional errors are corrected by means of a novel piezo controlled in-mould positioning system developed by Fraunhofer IWU. Second, the OCT technology also allows for measuring cross-section tomographic images in a non-destructive way. Therefore, internal defects, like inclusions, holes, etc. can be easily detected.

Bringing OCT directly into the injection moulding process allows to monitor product quality directly during or after injection moulding. This will make it possible to adjust process parameters to counteract if the quality is decreasing.

Details

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Project Consortium:

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