EUREKA CLUSTER PROJECT

EURIPIDES ²

12-1310 UPMOST

ULTRAFAST LASERS FOR MOBILE DISPLAY MANUFACTURING

Ultrafast lasers could make next-generation electronic display technologies significantly more cost-effective to manufacture. These lasers have now been rolled out by EURIPIDES² UPMOST project partners in production plants in Asia and have helped to open up new business opportunities.

AMOLED (active matrix organic light emitting diode) is a display technology increasingly used in smartphones, televisions and other electronic devices because it offers sharper image quality, brightness and contrast. Until recently however, industrial manufacturing processes have not been able to keep up with demand and deliver high-margin yields.

In order to address this, the UPMOST project, supported by the EUREKA cluster EURIPIDES², set about refining and testing ultrafast laser technology with the intention of delivering cost-effective higher yields in AMOLED manufacturing.

The key benefit of ultrafast lasers is that they are capable of cutting multi-layered organic-metal thin films on panels without damaging them. "Within the AMOLED display are lots of polymer layers," explains UPMOST project coordinator Eric Mottay from Amplitude Systemes, France. "From a technical point of view, it is very difficult to process these layers, as they are very sensitive to heat."

What the UPMOST laser does is to use extremely short pulse durations – a millionth of a billionth of a second – so that processing and repair work can be completed long before any heat is generated and transferred to the polymer. Up until the early 2000s, this laser technology was mostly dedicated to research and was not on the radar of any manufacturing companies.

"We have been able to tap into a general trend here," says Mottay. "Demand for high precision processing that produces no heat can be seen everywhere, from semi-conductors to automotive and medical device manufacturing. But there are not that many technologies that can fulfil this requirement, so this project has come along at the right time for us. The technology is there; the challenge has always been scaling up."

Mottay notes that this laser technology is increasingly accepted by many major industries and is now mature enough to achieve significant market penetration. The technology is also young enough to still offer significant potential in burgeoning high tech sectors such as personal electronics. Full-HD AMOLED displays are now used in most high-end mobile displays, and this trend will most likely continue given that Apple decided to use AMOLED for its iPhone 8 series. This could not be achieved without ultrafast laser pixel processing, which offers higher yields.

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"Our lasers are now being used on the factory floor in Asia," says Mottay. "We have just signed a strategic partnership with Samsung, and have opened up a subsidiary in Korea to help us develop this market." Project partners Amplitude and Korean machine manufacturer HPK have since expanded their operations and doubled their workforces compared to 2012.

"For us, projects like UPMOST allow us to work with companies and institutes that are complementary across value chain," says Mottay. "It's a bit like a car; we might be the engine, but without the other parts, we can't go anywhere." Amplitude and HPK were also joined by research institutes and companies in France and Belgium.

Indeed, the strength of the EUREKA cluster EURIPIDES² is that it gathers together SMEs and research institutes to drive forward innovative, industry-driven, pre-competitive R&D projects for Smart Electronic Systems.

UPMOST is the winner of the 2017 EUREKA Innovation Award for projects making significant headway developing an innovative product, service or process.

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MAIN PARTNER

Amplitude Systemes
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OTHER PARTNERS

KIMM, France
HPK, South Korea
Alphanov, France
Lasea, Belgium

TOTAL R&D INVESTMENT

€ 2.6 M

DURATION

September 2012 to September 2015

COUNTRIES INVOLVED

EUREKA is a European network for market-oriented R&D.

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