



PATHFINDER 2016

## ADVANCED MANUFACTURING PROCESSES

# Towards single micron LIFT technology (SIMLIFT)

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Laser Induced Forward Transfer (LIFT) is a key enabling technology for large-area processing of electronics and is capable of printing a wide range of materials rapidly and digitally. A major barrier for large scale adoption of the technology is the current achievable printing resolution, commonly limited to tens of microns. SIMLIFT or Single Micron LIFT aims to be a transformative development of this technology, overcoming current limits and refining resolution to a new level.

In LIFT, a donor substrate ink carrier is locally irradiated by a short laser pulse causing the transfer of material from the donor layer to a receiving substrate. The donor layer and laser processing are key to achieving precision in patterning. To address the challenge of reliable single micron patterning, SIMLIFT will analyse the effect of varying thin film donor deposition processes on the donor film morphology and resulting transfer; and it will explore the interaction with laser pulse duration which dictates the physical ejection mechanism (from nanosecond to femtosecond duration). The accuracy of laser processing will be further explored through the novel integration of microlens arrays for affordable accurate digital patterning. The parameters will be systematically analysed and compared at a dimensional scale close to that of the laser wavelength; introducing novelty both in donor deposition and laser processing, to provide new insights and scalable technological solutions.

This Pathfinder project brings together academic and industrial partners to provide a unique perspective through the combination of various stakeholder skills. The project will be led by Davide Deganello at the Welsh Centre for Printing and Coating (Swansea University), a leading research centre in printing and printed electronics, with the key partnership and support of Oxford Lasers, a leading British Industrial laser technology system integrator. The project will also benefit from the support and guidance offered by a dedicated industrial end-user advisory board, whose members include NeuDrive, PragmatIC, Microsemi and NSG, who will be looking to help ensure the sustainability of this newly developed technology.

