Project Overview

Hi-Accµracy is developing new printable materials and innovative additive fabrication processes to create next generation display technologies at 1 µm resolution.

Materials such as quantum dots (QD), novel organic semiconductors and conductive inks that can be produced at low cost, with minimal environmental impact are being developed within the project.

Hi-Accµracy is employing a variety of deposition techniques and new additive fabrication processes including:

- Electro-static jetting (ESJET)
- Reverse-offset printing (ROP)
- Nano-imprint lithography (NIL)
- Atomic layer deposition (ALD)
- Aerosol assisted ion deposition (AAID)

The consortium team will deliver the speed and accuracy required to successfully produce µm scale structures commercially.

Display structures will be printed on flexible sub-strates that may be applied to virtually any surface. These technologies utilise printed electronics down to µm size for many applications including:

- Organic Large Area Electronics (OLAE)
- Thin Film Transistor (TFT)
- Large and small area high-resolution displays

Consortium

11 partners from across Europe:

BNN

CRF CENTRO RICERCHE FIAT

DYCOTEC MATERIALS

Fraunhofer IAP

Humboldt-Universität zu Berlin

imec

JOANNEUM RESEARCH

NeuDrive LEADING OTFT TECHNOLOGY

pvi PRECISION VARIONIC INTERNATIONAL

UCL

VTT

Our advisory board:

SONY

HUAWEI

POLAR

Learn more about the project and partners at www.hi-accuracy.eu

Hi-Accµracy

Hi-Accµracy's printed, thin, flexible, low cost and sustainable displays will offer outstanding quality and resolution.

The displays will be employed in high-resolution applications from automotive interiors to affordable, light-weight wearable tech and flexible information screens.

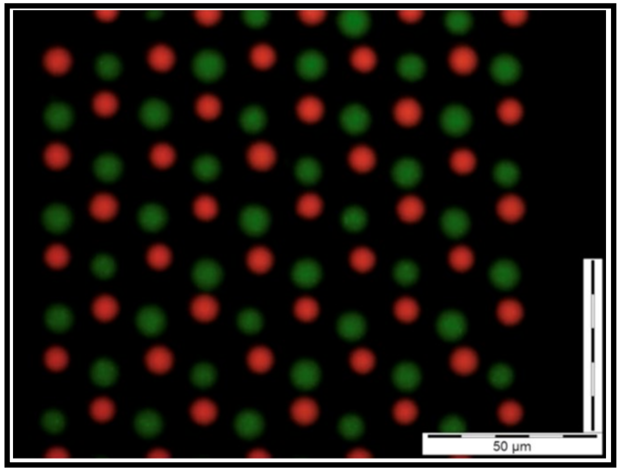


Image © Fraunhofer IAP

Hi-Accµracy project has received funding from the **European Union's Horizon 2020** research and innovation programme un-der grant agreement 862410

Motivation

The Hi-Accµracy consortium's aim is to develop materials and techniques to allow the commercial printing of high-resolution, inexpensive, environmentally friendly displays on to almost any materials, including flexible substrates. Applications of these displays include lightweight, wearable, networked entertainment devices (phones), health monitors or in-car info-tainment / communication systems. Low cost and sustainable, the technology creates many opportunities for breath-taking design and product innovation.

Image © FCA

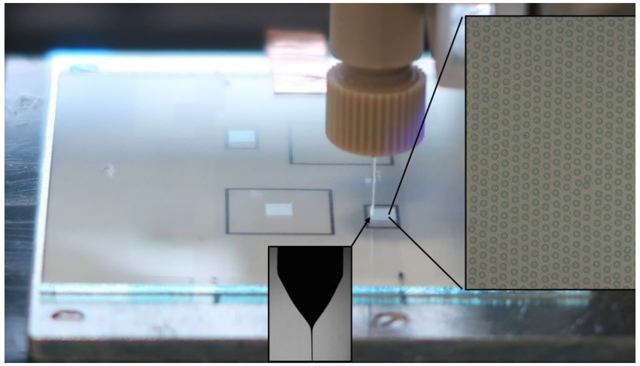
Technical Design

To demonstrate this exciting technology, the project consortium is working towards a 1", 300 ppi full-color display with a sub-pixel pitch of 28 µm x 84 µm.

To achieve such high resolution in a printed application, a compact 2T1C pixel, optimised for the printing processes, will be used. The system utilises an external FPGA controlled driver, with a custom-designed interface, to over 700 flexible connections on the display substrate.

Materials

Hi-Accµracy employs low-temperature curable, nano-Ag / nano-Au conductors and p-type organic semiconductors with intrinsic mobility of 10-20 cm^2 V-1 s-1. The electroluminescent materials in the QD-LEDs consist of InP / ZnSe / ZnS quantum dots (QDs). Finally, multiple barrier layers, using materials such as Al_2O_3 and ZrO_2 , lock out atmospheric moisture and oxygen to provide device durability in everyday environments.

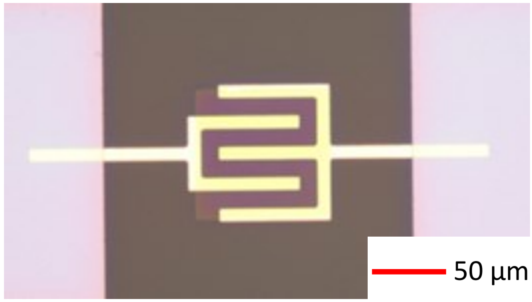


ESJET printing used to precisely deposit 10 µm droplets, forming pixels in a display screen. Image © Fraunhofer IAP

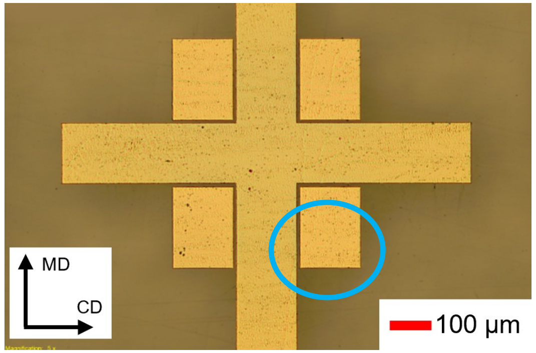
Methods

Reverse off-set and ESJET printing are both being used to create device backplane structures. Light emitting stacks are layered using ESJET, NIL, ALD and AAID techniques.

A variety of deposition methods are being trialled to identify those best suited to the aims of the project. VTT—the Technical Research Centre of Finland, a Hi-Accµracy project partner, are pioneering Reverse offset Printing.



RoP printing is being used to produce intricate device features. Image © VTT



VTT have also demonstrated printing of two layer structures with extraordinary accuracy. Note how precisely the gaps in the print are being maintained. Image © VTT

Hi-Accµracy is focused on developing next generation, printed displays, but the project's outputs will extend across printed electronics applications. Speak with us to learn more.