

# Printed Electronics Helix Launch Event

21 September



# Novel applications for In-mold Electronics



## MADRAS project

Developing advanced materials to be promptly processed via In-mold Electronics to fabricate a new generation of plasmonic products to make OLAE-based devices more affordable and durable.

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### Materials Improvement

Five materials with enhanced electrical properties:

- Nanocellulose substrate
- Ag NWs and Ag NPs-based ink
- PEDOT:PSS-based ink
- PEDOT:PSS:WO<sub>x</sub>-based ink

### Processing by In-Mould Electronics

Allow high speed manufacturing methodology

- Design and printing of devices
- Assembly of control circuits
- Thermoforming and injection moulding processing

### Demo product manufacturing

Materials and processes applied to three cases:

- Flexible geolocation tag
- Photodetector fingerprint sensor
- In-mold solar modules
- Upscaling of materials and IME processing

### Validation in relevant environment

- Geolocalization of the tag tested in an operative warehouse
- Biometric readers incorporated into testing scooters

# Novel applications for In-mold Electronics

## Outcomes



Novel conductive and semiconducting inks fit for IME

Nanocellulose-based substrates for printed electronics

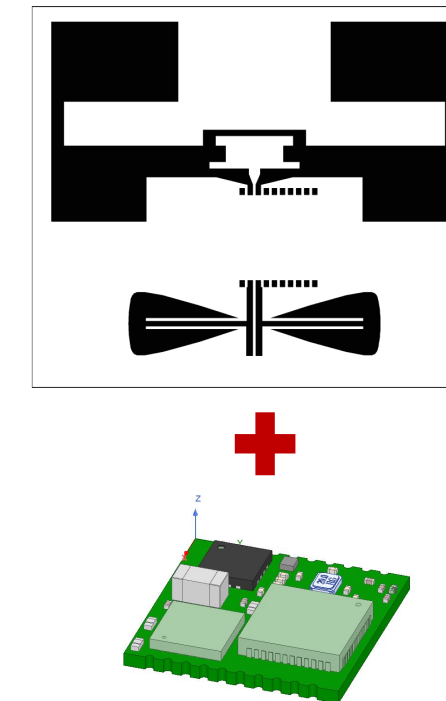
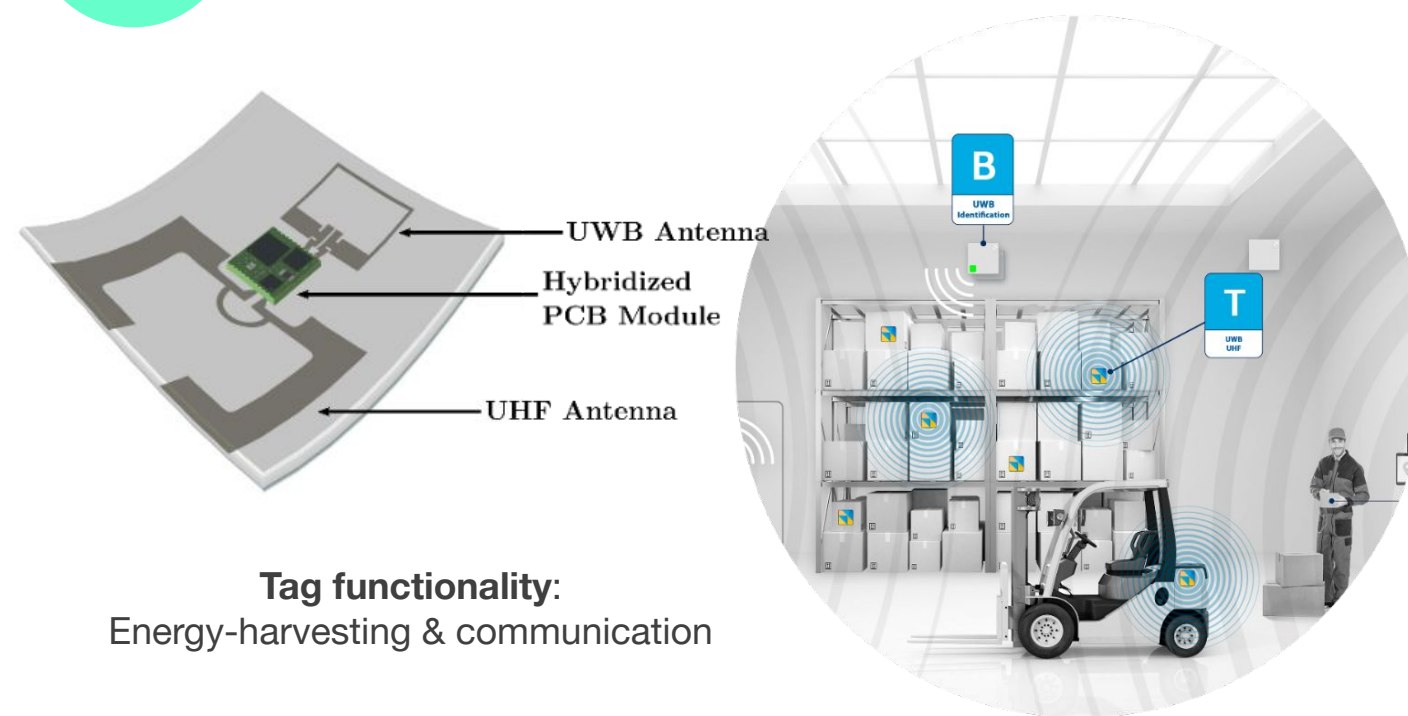
In-mould encapsulation of PCBs on printed circuits

IME applied on tags with embedded antennas

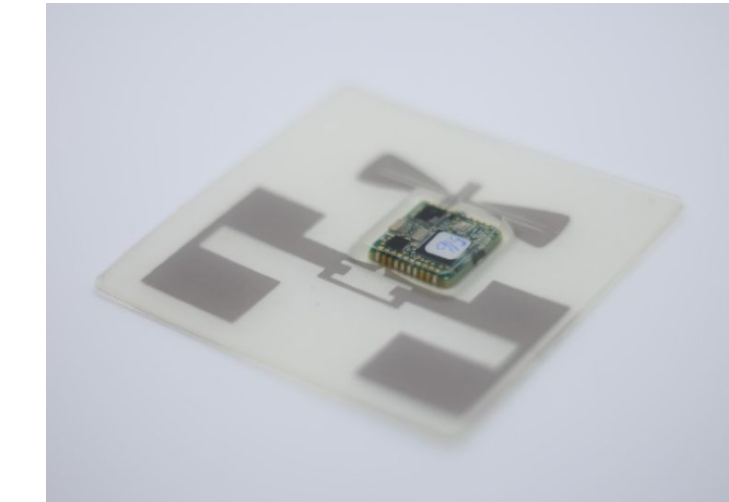
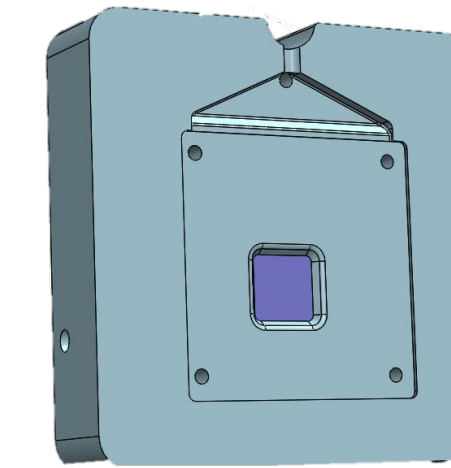
3D-shaped photosensing imagers

IME applied on printed optoelectronics (OPD, OPV)

## 1 A geotracking flexible tag for the packaging and logistics sector

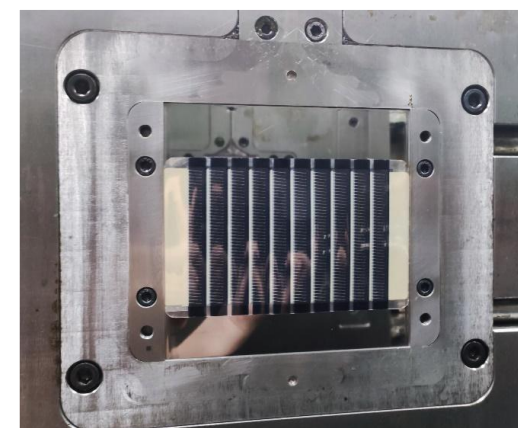
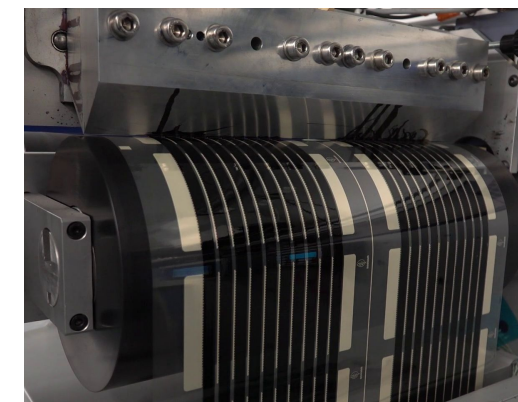
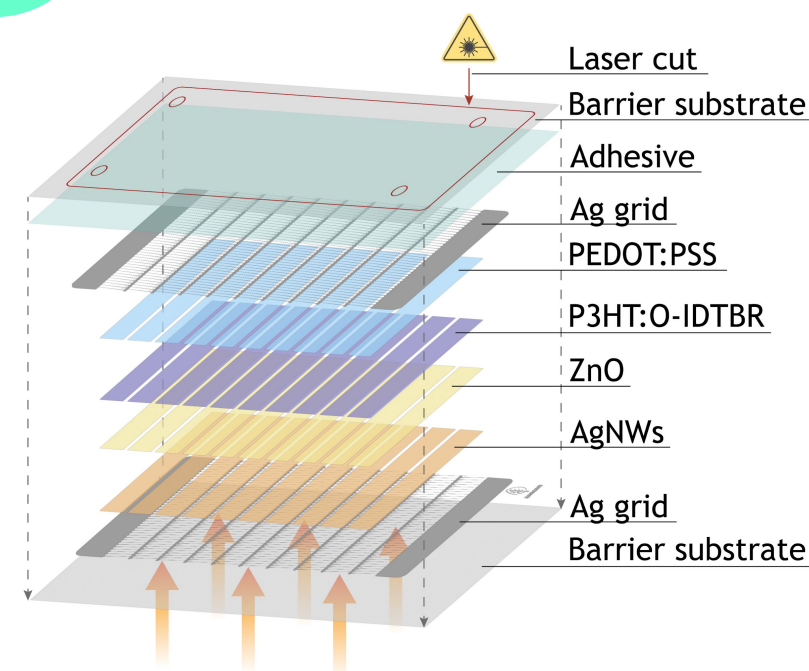


Inject molding rigid control units

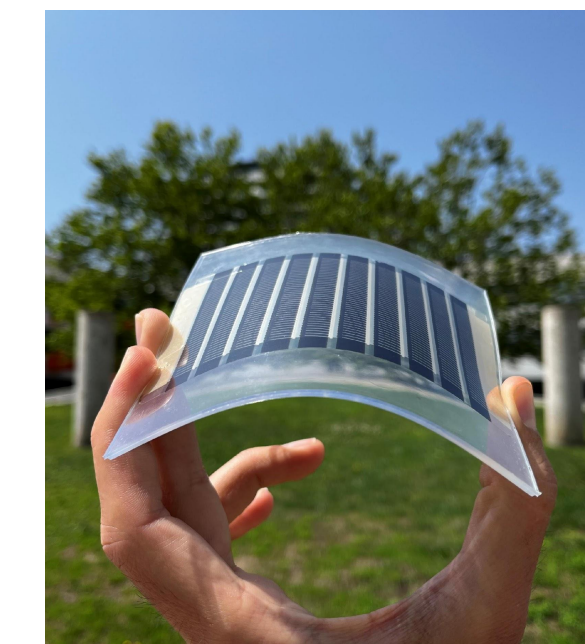
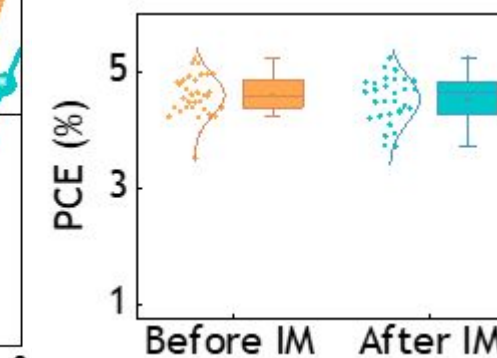
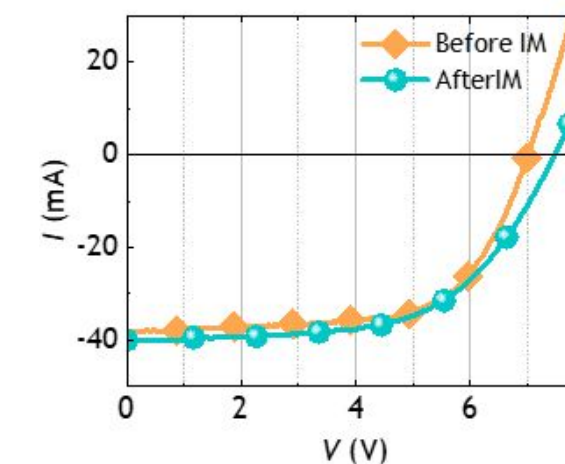
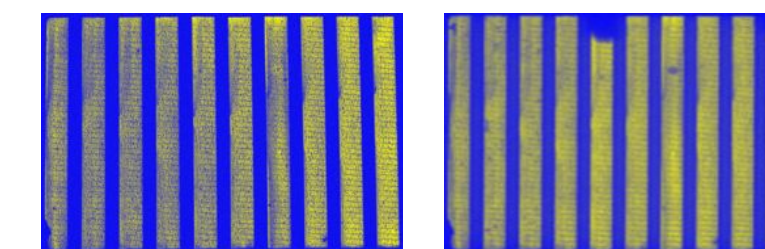


- ✓ Flexibility
- ✓ Protection to antennas and control units
- ✓ Highly performing inks
- ✓ Compatibility between nanocellulose and injected TPU

## 2 In-mold OPV modules



Before in-mold    After in-mold



- ✓ Large-scale fabrication of OPV modules embedded into structural plastic parts
- ✓ No efficiency losses
- ✓ Process yield of 90%