An experimentally-validated multi-scale materials, process and device modelling & design platform enabling non-expert access to open innovation in the Organic and Large Area Electronics Industry (MUSICODE)

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Fabrication of OLAE test materials and devices

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Glossary

AFM	Atomic Force Microscopy
Ag	Silver
Al	Aluminium
AOI	Area of Interest
Ca	Calcium
DIT	Dark-Injection Transient
EOD	Electron Only Devices
ETL	Electron Transport Layer
FF	Fill Factor
HOD	Hole Only Devices
HTL	Hole Transport Layer
IMI	Indium Metal Indium (an ITO alternative)
ITO	Indium Tin Oxide
Jsc	Short Circuit Current
NFA	Non-Fullerene Acceptor
NW	Nano Wire
OE	Opto-Electronic
OLED	Organic Light Emitting Diode
OPV	Organic Photovoltaic
OVPD	Organic Vapor Phase Deposition
PAL	Photoactive Layer
PCE	Power Conversion Efficiency
PCE	Power Conversion Efficiency
PET	Polyethylene Terehthalane
PL	Photoluminescense
PPV	Perovskite Photovoltaic
R2R	Roll-To-Rolle
SCLC	Space-Charge-Limited-Current
SE	Spectroscopic Ellipsometry
Voc	Open Circuit Voltage
WP	Work Package

Contents

Publishable summary

This document reports the work carried out in Task 3.1 “Fabrication of test opto-electronic (OE) materials and devices (M1-12)” under the WP3 “Model validation by analytical characterization (M1-M36)”. WP3 conducts experimental tests and characterization to validate the models of WP2. Task 3.1 focuses on the fabrication of these test OE materials and devices. To facilitate a roadmap for this, all partners collaborated during the first months of the project in WP1 Task 1.1 to specify the OE materials and devices needed, and the processes to be used for fabricating them.

This report shows the experimental work undertaken so far in Task 3.1. Small organic photovoltaic devices (OPV) with photoactive areas below 1 cm^2 were fabricated. The devices were manufactured by different partners. Some devices were fabricated using the spin-coating technique in conjunction with vacuum deposition, whereas others were fully solution processed. Single carrier devices were also fabricated by different partners using the fabrication techniques above. These devices were used to measure the charge carrier mobilities of pure donor materials (hole only devices, HOD), leading to the collection of first set of data. Also, the first opto-electronic (OE) layers were deposited by means of organic vapor phase deposition (OVPD). These layers were characterized by spectroscopic ellipsometry (SE), laser microscopy, photoluminescence (PL), and atomic force microscopy (AFM). Valuable data such as refractive indexes, deposited layer thicknesses, substrate coverage, emission characteristics, and surface roughness were extracted.