

Relation between coating defects and device performance: Understanding failure mechanisms in solution processed OLED and OPV

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Keywords: Coating defects, OLED, OPV, failure mechanisms

Defects present in a product will compromise severely its performance and, in certain situations, will lead to rejects, reducing the overall production yield. Fig. 1 gives some impression of defects in OLEDs. To avoid defects in products during production it is important to understand the causes for the defects. However, currently little is really known about the relation of particles and coating defects to the final performance of OLED and OPV. Therefore, we have decided to evaluate the impact of different contaminations and defects in the various layers on the product performance. Fig. 2 gives an overview of some potential causes for device defects.

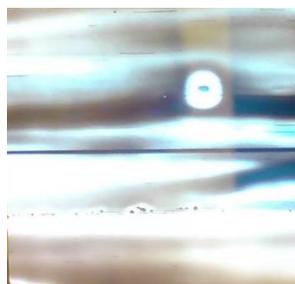


Fig. 1: Solution processed white OLED displaying visible colour and brightness inhomogeneity

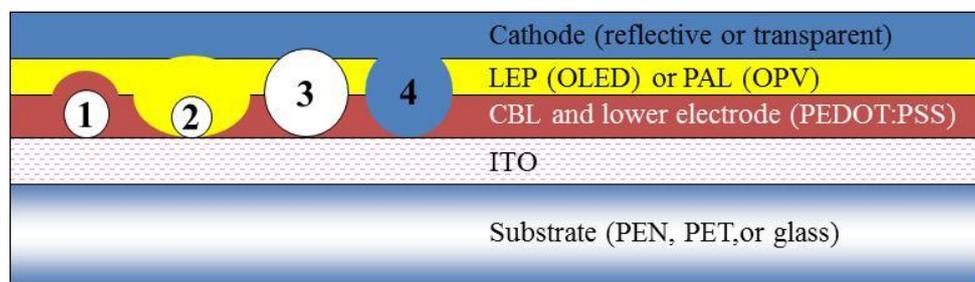


Fig. 2: Stack of OLED and OPV as used in the experiments. Dots 1 to 4 indicate possible positions/sizes of particles in this stack: (1) particle or additive coating defect in lower electrode (2) open spot in lower electrode layer (3) particle connecting electrodes (4) open in isolating layers

To identify the relevant causes of defects a qualitative and quantitative study of the relation between defect and device performance has been carried out. For this purpose we have introduced defects artificially into devices to study and quantify their impact on the device performance. In addition we have studied 'natural' occurring processing related defects in devices.

Here we will present our experimental approach and results as well as the ensuing implications for coating and printing processes and equipment.

The research leading to the results has received funding from the European Union Seventh Framework program under grant agreement no. 281027 [1].



References

1. More information can be found at the project website: www.clean4yield.eu