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Industrialization of OLEDs for Lighting Applications and Displays[1]

KLEMENS BRUNNER, Philips Research, Prof. Holstlaan 4, 5656AA Eindhoven and Philips Lighting Mathildelaan 1, 5611BD Eindhoven; The Netherlands

Organic light emitting diodes (OLEDs) are an extremely versatile technology that can be tailored to specific applications. The flexibility and adaptability of OLED technology is a result of the variety of material systems and fabrication technologies that can be applied. In this contribution we investigate and compare several material systems and fabrication technologies from an application point of view. Applications without the need of micro-scale structuring open a new window of opportunity for evaporated small molecules. Small molecular OLEDs have the potential for high efficiencies at high brightness rendering them ideal for lighting applications . The first part of our contribution will establish the boundary conditions for lighting applications and we will introduces the current status of our industrialization program for OLEDs for lighting and present our perspective of the OLED lighting market. In the second part of the contribution we will focus on alternative OLED technologies that offer interesting perspectives for industrial fabrication. The light-emitting electrochemical cell (LEC) is a type of organic electroluminescent device that has all the attractive features of the OLED but does not have the drawbacks of reactive cathodes and thin active layers. The crucial difference with OLEDs is that the active layer of a LEC contains mobile ions. This results in two very important advantages for large-area lighting applications compared with traditional OLEDs: (i) thick electroactive layers (ii) and matching of the work function of the electrodes with the energy levels of the electroluminescent material is not required. This means that non-reactive metals such as Ag or Au can be used instead of e.g. Ba. We have studied several types of LECs with the aim to assess the above-mentioned benefits for large-area lighting . Finally to show the immense spectrum of production methods for OLEDs we will conclude the contribution with a manufacturing technique for solution processable material systems: inkjet printing.

In collaboration with Eric Meulenkamp, Rene Wegh, Steve Klink, Simone Vulto, and Dietrich Bertram.

[1]Philips Research, Prof. Holstlaan 4, 5656AA Eindhoven and Philips Lighting Mathildelaan 1, 5611BD Eindhoven; The Netherlands