65 Novel Processes for Solution OLED

Date: Aug. 31, 2017 (Thursday)
Time: 16:00~17:35
Session Chair: Dr. Alexander Colsmann
(Karlsruhe Institute of Technology, Germany)

A65-1

16:00~16:25

Invited High Efficiency Perovskite Quantum-Dot Light-Emitting Devices by Effective Washing Process

Takayuki Chiba, Keigo Hoshi, Yong-Jin Pu, Yuya Takeda, Yukihiro Hayashi, Satoru Ohisa, and Junji Kido (Yamagata Univ., Japan)

Here, we fabricated low driving voltage and high efficiency $CsPbBr_3$ perovskites quantum dots (PeQDs) light-emitting devices (PeQD-LEDs) using a PeQDs washing process and energy level alignment of the device. The PeQD-LED with butyl acetate-washed PQDs exhibited a maximum power efficiency of 31.7 lm W–1 and EQE of 8.73%. Control of the interfacial PeQDs through ligand removal and energy level alignment in the device structure are promising methods for obtaining high PLQYs in film state and high device efficiency.

A65-2

16:25~16:40

Blade-Coated Dual Color Polymer Light-Emitting Diodes (PLEDs) for Optoelectronic Sensors

Donggeon Han, Yasser Khan, Jonathan Ting, and Ana Arias (UC Berkeley, USA)

Here, a blade coating technique for printing multicolor PLEDs on one substrate using surface energy patterning is presented. By selectively creating hydrophilic regions on the substrate, green, red, and near-infrared PLEDs are fabricated. Since this method allows printing of multicolor PLEDs, a reflection-mode pulse oximeter sensor composed of red and green PLEDs and a silicon photodiode on a flexible substrate is demonstrated on the wrist. Finally, it is demonstrated that the reflection-mode pulse oximeter can accurately record pulse and oxygenation values at the wrist.

A65-3

16:40~16:55

A New Method to Achieve High Resolution OLED Displays by Ink-Jet Printing

Dejiang Zhao, Wei Huang, Bo Jiang, Shan-chen Kao, Guangcai Yuan, Lu Wang, and Jaiil Ryu (BOE Tech. Group Co., Ltd., China)

We designed a new bank structure,this structure has two layers bank, the bottom one is pixel defined layer and the top one is ink resistant layer (also named printing pxiel). The PLED ink is printed into the printing pixel at first, during the dry process, the ink can be divided into four subpixels equally and then become symmetrical film in each subpixel, ppi can reach four times higher based on this design. In our test cell, the resolution had been updated to 248ppi by this method.

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A65-4 16:55~17:20

Invited Full-Color Quantum Dots Active Matrix Display based on Ink-Jet Printing

Junbiao Peng (South China Univ. of Tech., China)

Full-color active matrix quantum dot light emitting diodes (AM-QLEDs) with ink-jet printing technology have attracted much attention because of their potential manufacture advantages of large screen size, wide color gamut and low cost. In the presentation, an efficient full-color AM-QLEDs display with pixel density fabricated by ink-jet printing technique.

A65-5 17:20~17:35

High-Efficiency Solution-Processed Organic Light-Emitting Diodes

Le Yang, Dawei Di, and Richard H Friend (Univ. of Cambridge, UK)

Vacuum-deposition is the mainstream technology for producing high-efficiency OLEDs, as it can maintain high precision control and render versatility in the fabrication process. But the high cost and material wastage pose a problem. Solution-processing routes could be a cheaper option and a possible pathway towards printable electronics. Material consumption can be minimised, though current technologies that use a very thick emissive layer can still be materials-costly. Solution-processed devices often produce lower efficiencies, due to irreproducibility and less interfacial control. Herewe present a versatile multilayer solution-processable route that can be commercially competitive. Our efficiencies rival that from vacuum-deposited devices. We also only require a minute amount of emissive materials in a very thin emissive layer, thus lowering material wastage. Besides, it is a versatile architecture that accommodates many commercially-available emitters. Lastly, it is noteworthy that all layer thicknesses in the multilayer structure can be retained, ensuring all underlying interfaces are intact and preserved. Examples of this architecture are shown in two recent publications: 1) a multicolour series of fluorescent OLEDs are studied for their triplet fusion-enhanced electroluminescence; 2) a newly discovered emission mechanism (Rotationally-accessed spin-state inversion, RASI) in new materials has led to record-efficient solution-processed OLEDs.