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White polymer LED and its integration with polymer transistor
HSIN-FEI MENG, Institute of Physics, National Chiao Tung University, Hsinchu, Taiwan — Bright white emission with peak luminance near 10,000 cd/m^2 is achieved in multi-layer homojunction polymer light-emitting diode (PLED) fabricated by multiple spin coating. The homojunction has the advantages of exciton confinement, carrier balance, and reduced cathode quenching. In order to be applied in an all-polymer active matrix display, multi-layer PLED is integrated with polymer transistor to form a polymer active pixel without the patterning of any polymer layer. The key idea is to replace the conventional conductive hole-transport layer (HTL) for the PLED by a semiconductor, which can then be shared with the transistor in the integrated structure. In this integration both the semiconductor layer and the emissive layer can be spin-coated in large area covering the whole active matrix. We use high mobility polymer polythiophene for the HTL and the transistor. Peak luminance of 3000 cd/m^2 for white emission on P3HT is reached. A 200 μm$\times\mu$m polymer active pixel free of patterning of any organic layer is demonstrated.

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