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Cathode interface studies of polymer light emitting devices

STEPHEN SWIONTEK, MARIAN TZOLOV, Lock Haven University of PA, NANOTECH-OLED TEAM — Efficient injection of charge carriers is a key factor for successful operation of any electronic device and especially of devices with non-crystalline or wide band gap active material. Our study concentrates on the cathode interface of light emitting devices with a conjugated polymer as light emitter. We apply two principally different methods for the cathode deposition, physical and chemical, in order to fundamentally understand if in addition to the commonly accepted notion for the matching of the work functions also material modification takes place. The completed devices are studied by steady-state electrical measurements, impedance spectroscopy, current and emission lifetime measurements, and electroluminescence spectroscopy. The morphology of the cathodes is studied by Scanning Electron Microscopy and the formation of additional phases by Energy Dispersive X-ray Spectroscopy. The results help to define ways for more cost efficient fabrication of light emitting devices with applications in displays, electronic newspapers, room illumination, etc.

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