

Tunable color parallel tandem organic light emitting devices with carbon nanotube and metallic sheet interlayers

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Abstract.

Parallel tandem organic light emitting devices (OLEDs) were fabricated with transparent multiwall carbon nanotube sheets (MWCNT) and thin metal films (Al,Ag) as interlayers. In parallel monolithic tandem architecture, the MWCNT (or metallic films) interlayers are an active electrode which injects similar charges into subunits. In the case of parallel tandems with common anode (C.A.) of this study, holes are injected into top and bottom subunits from the common interlayer electrode; whereas in the configuration of common cathode (C.C.), electrons are injected into the top and bottom subunits. Both subunits of the tandem can thus be monolithically connected functionally in an active structure in which each subunit can be electrically addressed separately. Our tandem OLEDs have a polymer as emitter in the bottom subunit and a small molecule emitter in the top subunit. We also compared the performance of the parallel tandem with that of in series and the additional advantages of the parallel architecture over the in-series were: tunable chromaticity, lower voltage operation, and higher brightness. Finally, we demonstrate that processing of the MWCNT sheets as a common anode in parallel tandems is an easy and low cost process, since their integration as electrodes in OLEDs is achieved by simple dry lamination process.