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Exciton quenching at PEDOT:PSS anode in polymer blue-light-emitting diodes

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Abstract

The quenching of excitons at the poly(3,4-ethylenedioxythiophene): poly(styrenesulfonic acid) (PEDOT:PSS) anode in blue polyalkoxyspirofluorene-arylamine polymer light-emitting diodes is investigated. Due to the combination of a higher electron mobility and the presence of electron traps, the recombination zone shifts from the cathode to the anode with increasing voltage. The exciton quenching at the anode at higher voltages leads to an efficiency roll-off. The voltage dependence of the luminous efficiency is reproduced by a drift-diffusion model under the condition that quenching of excitons at the PEDOT: PSS anode and metallic cathode is of equal strength. Experimentally, the efficiency roll-off at high voltages due to anode quenching is eliminated by the use of an electron-blocking layer between the anode and the light-emitting polymer. (C) 2014 AIP Publishing LLC.

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