PÔSTER - RESUMO - DISPOSITIVOS OPTOELETRÔNICOS

HOST-FREE HYPERFLUORESCENT OLEDS BASED ON SQUARAINE DYES FOR ORGANIC UPCONVERSION DEVICES

Guilherme Soares Emenes (guilherme.emenes@gmail.com)

Dayvid Mello Nascimento (dayvid@aluno.puc-rio.br)

João Pedro Ferreira Assunção (Joao.Ferreira@empa.ch)

Rafael Dos Santos Carvalho (rffispuc@yahoo.com.br)

Marco Cremona (cremona@fis.puc-rio.br)

Roland Hany (Roland.Hany@empa.ch)

Elodie Didier (elodie.didier@empa.ch)

Efficient detection and imaging in the near-infrared (NIR) spectral region are critical for applications ranging from information and communication technologies to robotics and machine vision systems. While current NIR imaging technologies rely predominantly on inorganic semiconductors, all-organic upconversion devices (OUCs) have recently emerged as promising alternatives for next-generation NIR light detection. OUCs consist of a monolithic integration of an organic NIR photodetector and an organic light-emitting diode (OLED), enabling wavelength upconversion within a fully organic platform [1,2]. In this work, we report host-free hyperfluorescent (HF) OLEDs designed for integration into OUC architectures. The devices employ CzDBA (5,10-Bis(4-(9H-carbazol-9-yl)-2,6-dimethylphenyl)-5,10-dihydroboranthrene) as a thermally activated delayed fluorescent (TADF) sensitizer and, for the first

time, a fully evaporated indole squaraine (ISQ) dye (1,3-Bis[(3,3-dimethylindolin-2-ylidene) methyl] squaraine) as the final fluorescent emitter [3]. Squaraine dyes are particularly attractive due to their narrowband red and NIR emission, high photophysical stability, and suitability for optoelectronic applications. The emitting layers were fabricated via thermal co-evaporation of CzDBA and ISQ at varying ISQ concentrations (0–10 wt% relative to CzDBA). The OLEDs' final structure were MoO3(Molybdenum(VI) Oxide)/ C60(Fullerene-C)/CzDBA:ISQ/TPBi(1,3,5-Tris(1-phenyl-1Hbenzimidazol-2-yl)benzene)/ Al (aluminium). CzDBA-only OLEDs exhibited high luminance values of up to 140,000 cd·m?² with emission centered at 560 nm. Upon incorporation of ISQ, an efficient and complete energy transfer from the TADF sensitizer to the squaraine emitter was achieved, resulting in a pronounced spectral shift toward 670 nm with significantly narrowed emission bandwidth. These results confirm the successful realization of a two-component, host-free HF-OLED architecture and highlight the potential of squaraine-based hyperfluorescent systems for high-performance organic upconversion and NIR optoelectronic devices.

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Palavras-chave: organic electronics; tadf oleds; hyperfluorescent oleds.