IMPACT OF TERTIARY AMINO LINKAGES ON THE PROPERTIES OF ELECTROACTIVE PHENOTHIAZINYL-BASED COMPOUNDS

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Organic light-emitting diode (OLED) technology has made significant advances in performance and becoming widely used in smartphone displays [1]. Self-emitting ability, transparency, true dark tone, and capability of being made flexible are some of the features of OLED displays, leading to a superior performance compared with liquid crystal displays. In addition to displays, OLEDs are also a strong candidate for lighting applications [2].

In this work, the effects of introducing tertiary amino linkages to phenothiazine derivatives, which act as delayed emission fluorophores, will be presented. The said compounds consist of either a pyridine- or benzonitrile moiety as an acceptor and phenothiazine as a donor. The compounds were synthesized by Buchwald-Hartwig cross-coupling reaction. The resulting electroactive compounds are thermally stable with 10 percent weight loss temperatures of 270 and 308 ^{o}C. Repeated scans of cyclic voltammetry showed that both compounds exhibit reversible oxidation. The emission type of the pyridine-containing phenothiazine derivative was found to be triplet-triplet annihilation, and the benzonitrile-containing derivative exhibited room-temperature phosphorescence. Further investigation in the benzonitrile-containing species showed perfect reversible oxygen sensing and fast oxygen response. This suggests that the compound shows promise as an analyte for oxygen sensing.

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[1] Shihao Liu, Wenfa Xie, Chun-Sing Lee, Organic light-emitting diodes, what's next, Next Nanotechnology. (2023).
[2] A. Salehi et al. Recent advances in OLED optical design. Adv. Funct. Mater. (2019)