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### Article

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## Appending triphenyltriazine to 1,10-phenanthroline: a robust electron-transport material for stable organic light-emitting diodes

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### ABSTRACT

There has been an increasing demand for high-performance and cost-effective organic electron-transport materials for organic light-emitting diodes (OLEDs). In this contribution, we present a simple compound 3-(3-(4,6-diphenyl-1,3,5-triazin-2-yl)phenyl)-1,10-phenanthroline through the facile Pd-catalyzed coupling of a triphenyltriazine boronic ester with 3-bromo-1,10-phenanthroline. It shows a high  $T_g$  of 112 °C. The ultraviolet photoelectron spectroscopy measurements reveal a deep HOMO level of –6.5 eV. The LUMO level is derived as –3.0 eV, based on the optical bandgap. The low-temperature solid-state phosphorescent spectrum gives a triplet energy of ~2.36 eV. n-Doping with 8-hydroxyquinolatolithium (Liq, 1:1) leads to considerably improved electron mobility of  $5.2 \times 10^{-6}$ – $5.8 \times 10^{-5}$  cm<sup>2</sup> V<sup>-1</sup> s<sup>-1</sup> at  $E = (2-5) \times 10^5$  V cm<sup>-1</sup>, in contrast with the triarylphosphine oxide–phenanthroline molecular conjugate we reported previously. It has been shown that through optimizing the device structure and hence suppressing polaron-exciton annihilation, introducing this single Liq-doped electron-transport layer could offer

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