Supplementary Information (SI) for Materials Chemistry Frontiers.

Supporting Information

Advancing Beyond PEDOT:PSS: Innovative Strategy for Stable and Efficient Quantum Dot Light-Emitting Diodes

*Chenguang Li, Jiale Wang, Dan Liu, Ping Zhang, Jie Wang, Yuting Li, Meile Chai, Zhongfeng Duan, Yan Fang, Xiaohong Jiang, Zuliang Du**

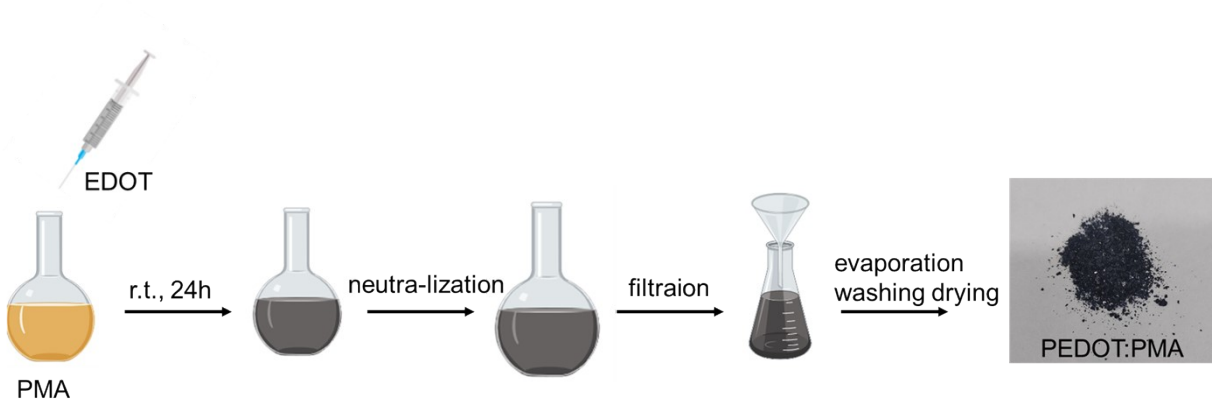
Characterization and Measurements.

The GPC was measured through Agilent PL-GPC50. The MALDI-TOF was measured through Bruker ultraflextreme MALDI-TOF/TOF. The FT-IR were measured through vertex 70 spectrometer. UV-vis absorption spectra were measured by a Jasco V-570 spectrometer. Contact angle was measured by SL150L contact angle measuring instrument. XPS spectra were performed by an ESCALab220i-XL XPS system. UPS measurements were recorded on a KRATOS Axis Ultra DLD spectrometer. The I−V relations were measured by a computer-controlled Keithley 2400 source meter. AFM morphology was performed by a SPA400 atomic force microscope. The J-V-L characteristics of the red QLEDs were carried out using a characterization system comprising a Keithley 2400 voltmeter together with a Photo Research 735 (PR-735) spectrometer under ambient condition. The T_{95} lifetime of the devices was measured by a QLED life test system of Newport Keithley N6705B.

Preparation of PEDOT:PMA.

PEDOT:PMA was synthesized according to the previous literature.[1]

PMA (1.825 g, 1 mmol) and deionized water (120 mL) were charged in a tube. Then the EDOT (0.284 g, 2 mmol) added drop-wise at r.t. under a nitrogen atmosphere. After the reaction mixture was stirred at r.t. for 24 h, the product was neutralized by ammonia and purified by filtration. After evaporating solvent, the black solid was washed with petroleum ether and dichloromethane, and finally a dark blue solid was obtained.



Scheme S1. Synthesis routes of PEDOT:PMA.

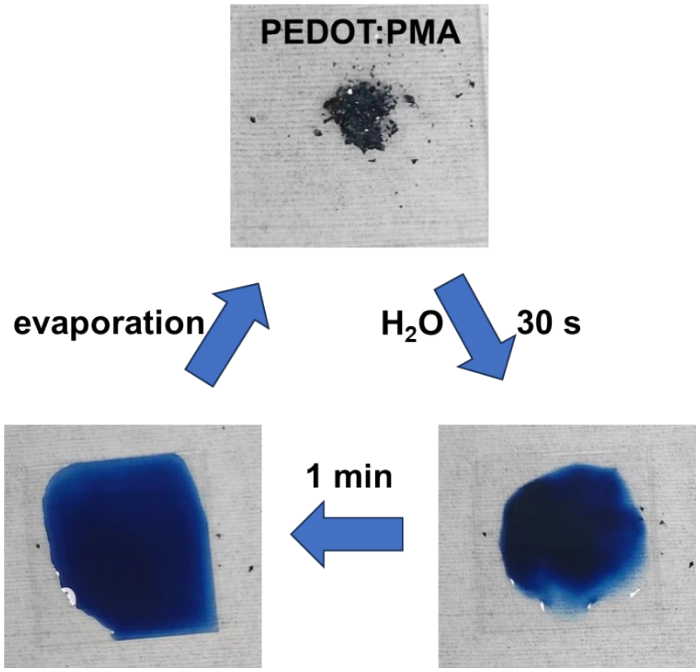


Fig. S1. Cycle experiment of PEDOT:PMA powder dissolution and precipitation.

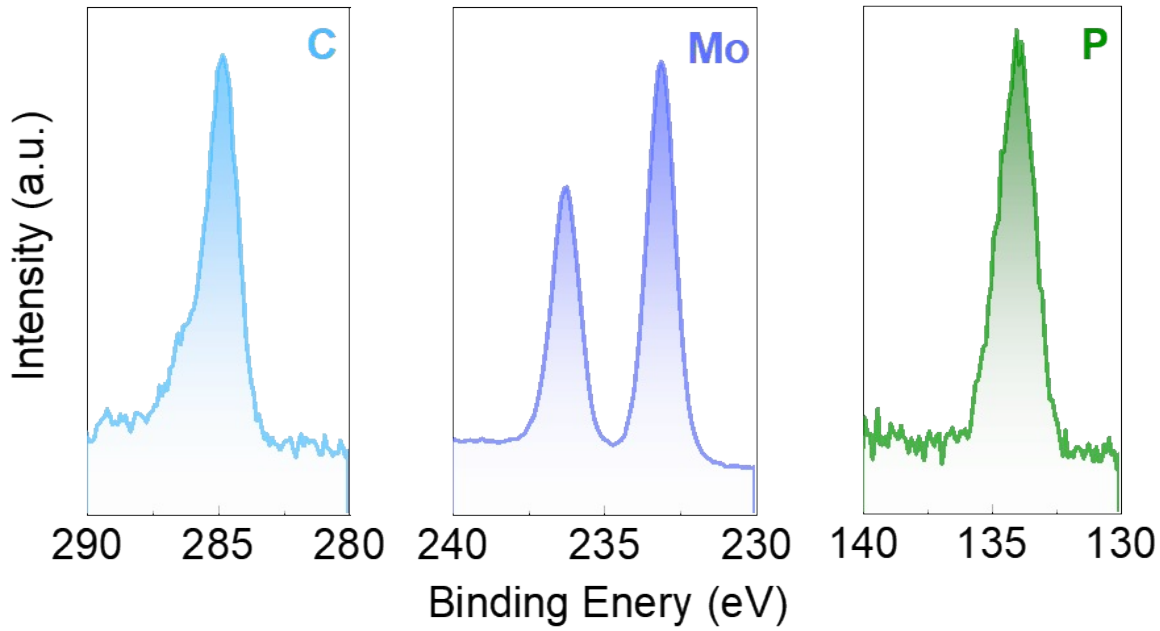


Fig. S2. XPS curves of PEDOT:PMA film.

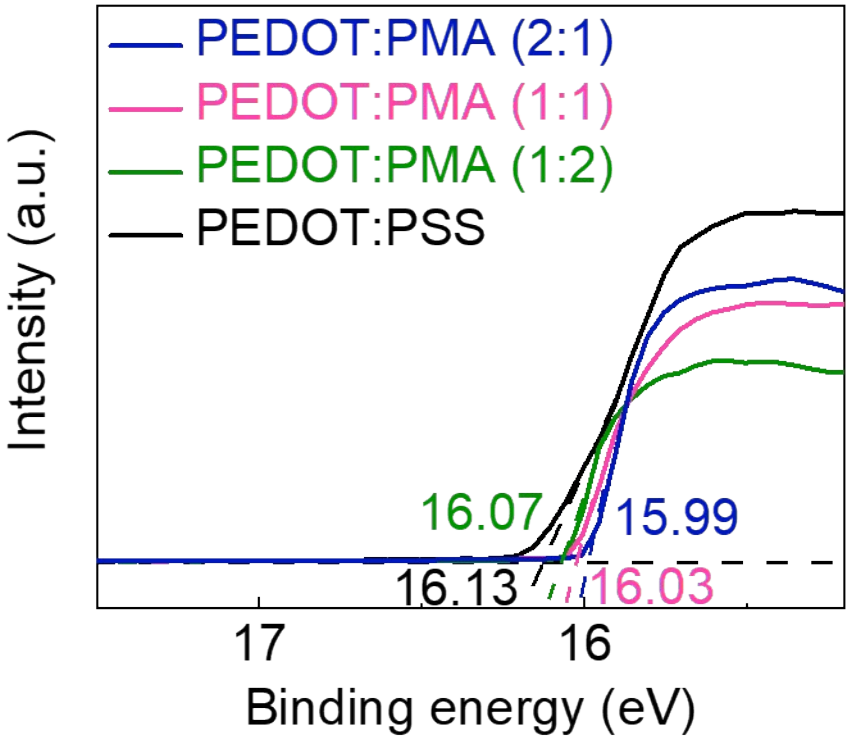


Fig. S3. UPS spectra of PEDOT:PMA and PEDOT:PSS film.

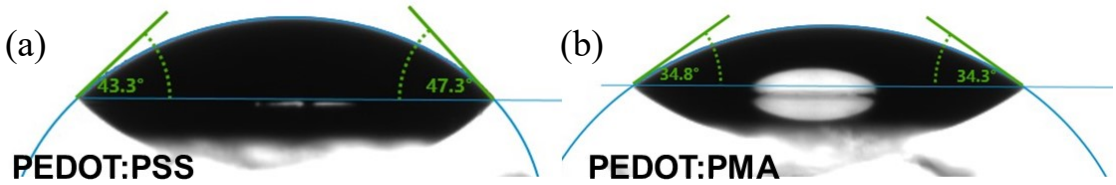


Fig. S4. Images of the contact angle of a) PEDOT:PSS and b) PEDOT:PMA on ITO substrate.

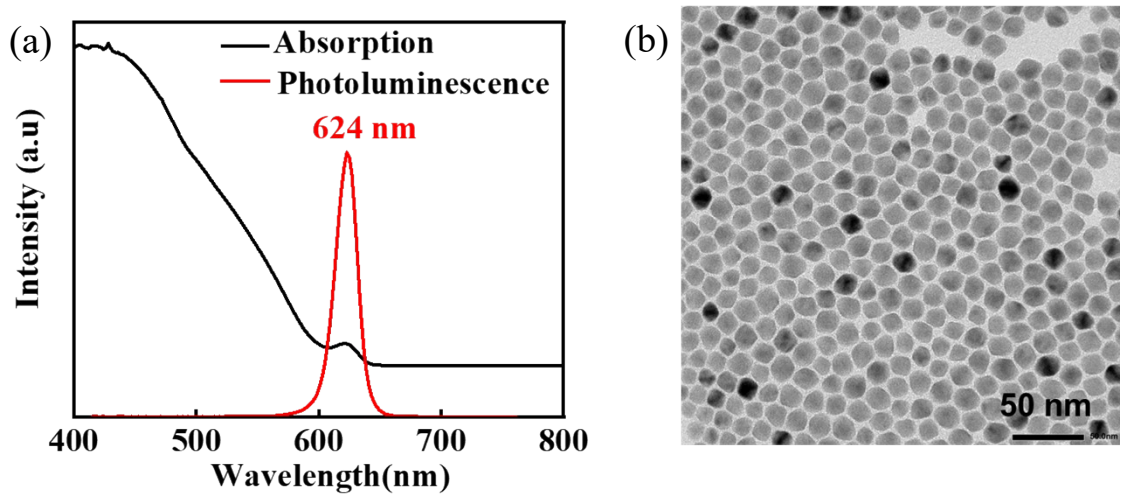


Fig. S5. a) UV-*vis* absorption, PL spectra and b) TEM images of red QDs.

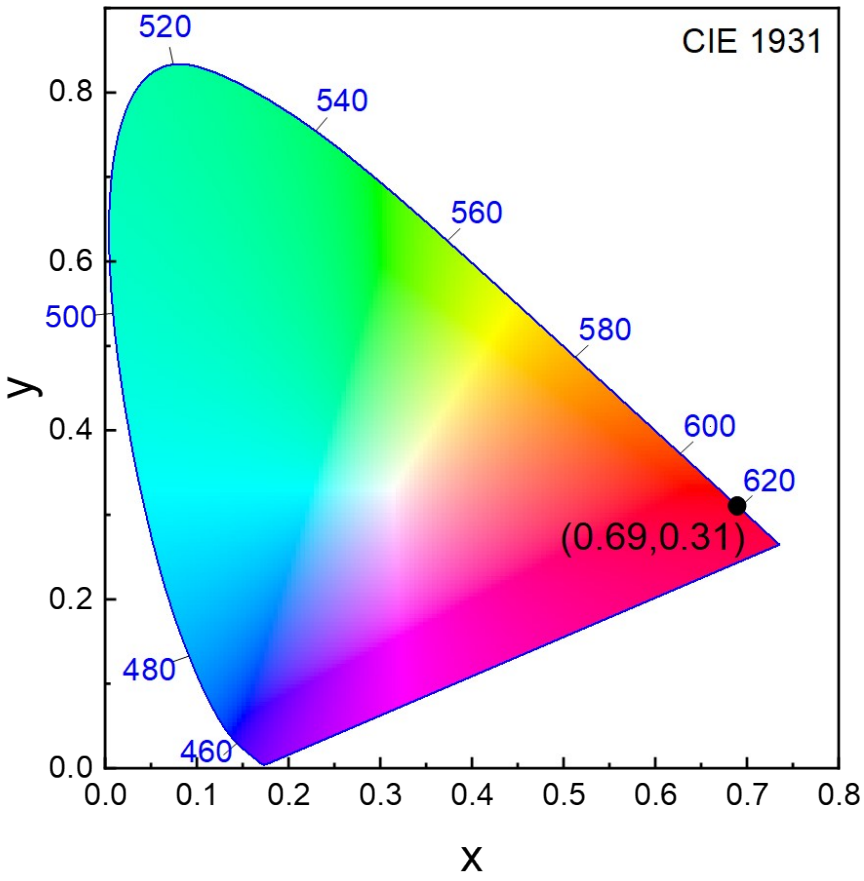


Fig. S6. a) CIE coordinate of red QLEDs.

References

[1] Q. Kang, Q. Liao, C. Yang, Y. Yang, B. Xu, J. Hou, A New PEDOT Derivative for Efficient Organic Solar Cell with a Fill Factor of 0.80, *Adv. Energy Mater.,* 2022, **12**, 2103892.