

Supporting Information for

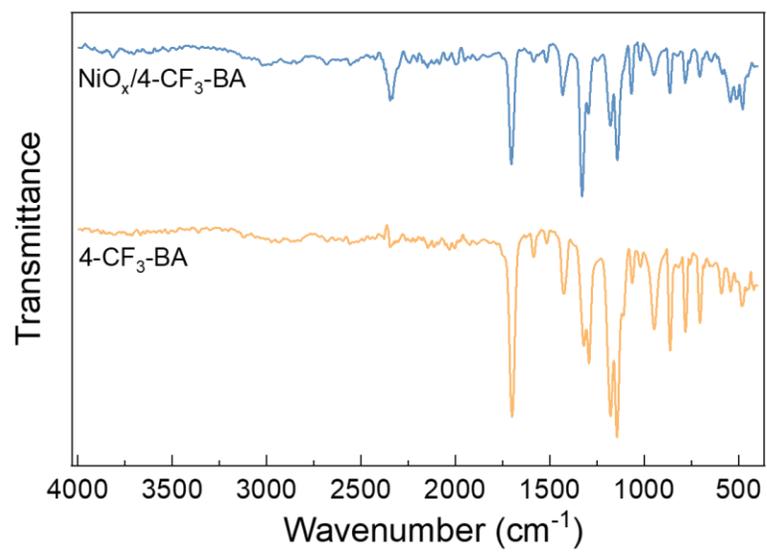
**Flexible Substrate-Compatible and Efficiency-Improved Quantum-Dot Light-Emitting Diodes with Reduced Annealing Temperature of NiO<sub>x</sub> Hole-Injecting Layer**

Shuai-Hao Xu<sup>+</sup>, Jin-Zhe Xu<sup>+</sup>, Ying-Bo Tang, Shu-Guang Meng, Wei-Zhi Liu, Dong-Ying Zhou,<sup>\*</sup> Liang-Sheng Liao

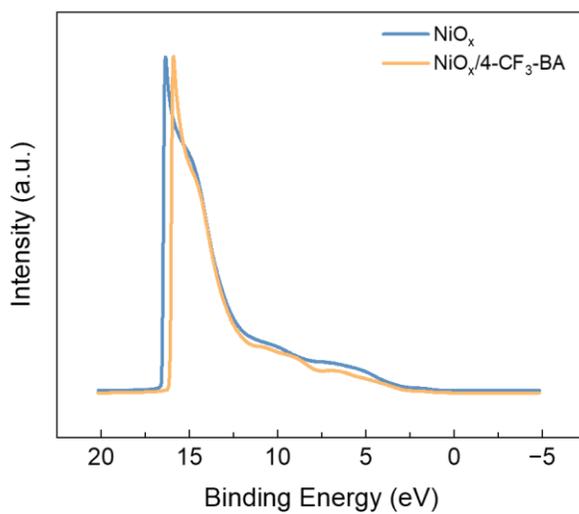
Institute of Functional Nano & Soft Materials (FUNSOM), Jiangsu Key Laboratory for Carbon-Based Functional Materials & Devices, Soochow University, Suzhou, 215123 Jiangsu, China

<sup>+</sup> These authors contributed equally to this work.

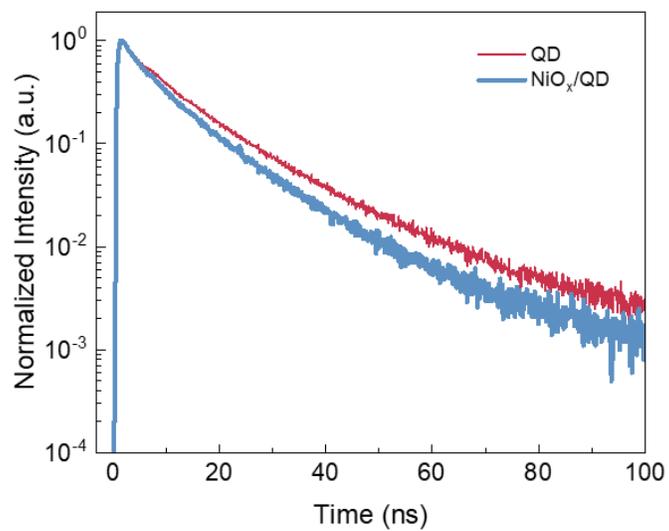
<sup>\*</sup> E-mail: dyzhou@suda.edu.cn



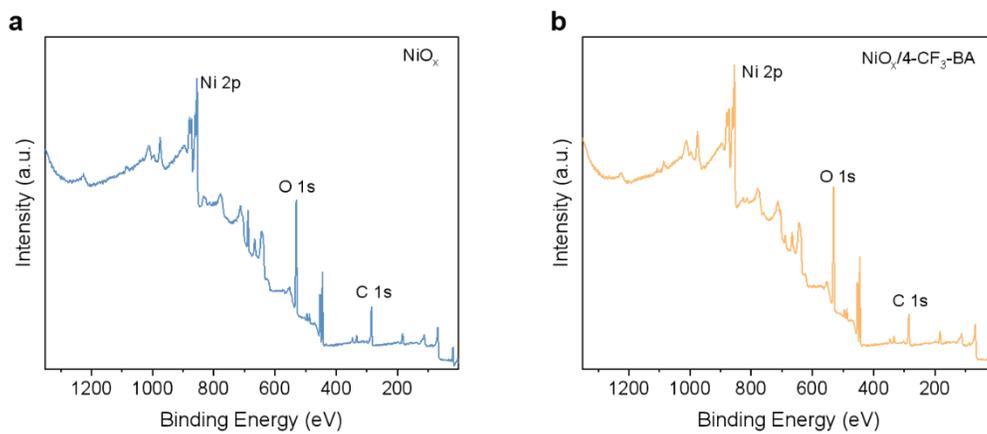
**Figure S1.** FTIR spectra of  $\text{NiO}_x$  with organic dipole molecule.



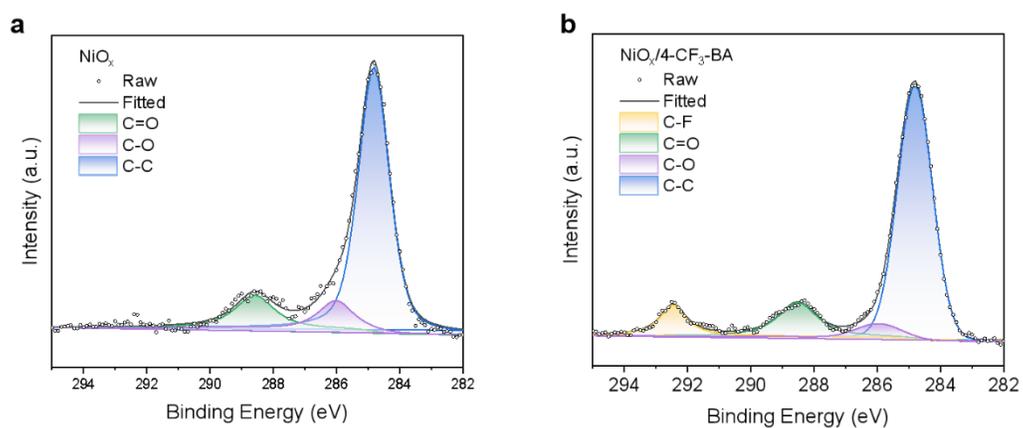
**Figure S2.** Full spectrum diagram of UPS.



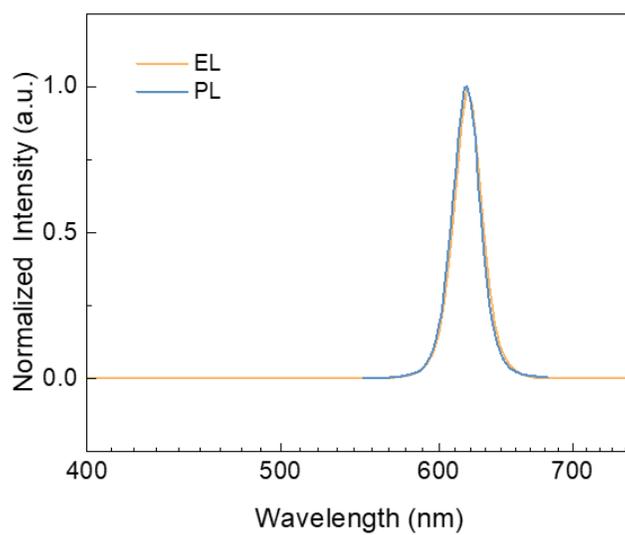
**Figure S3.** Time-resolved PL spectra of QDs coated on glass and NiO<sub>x</sub>.



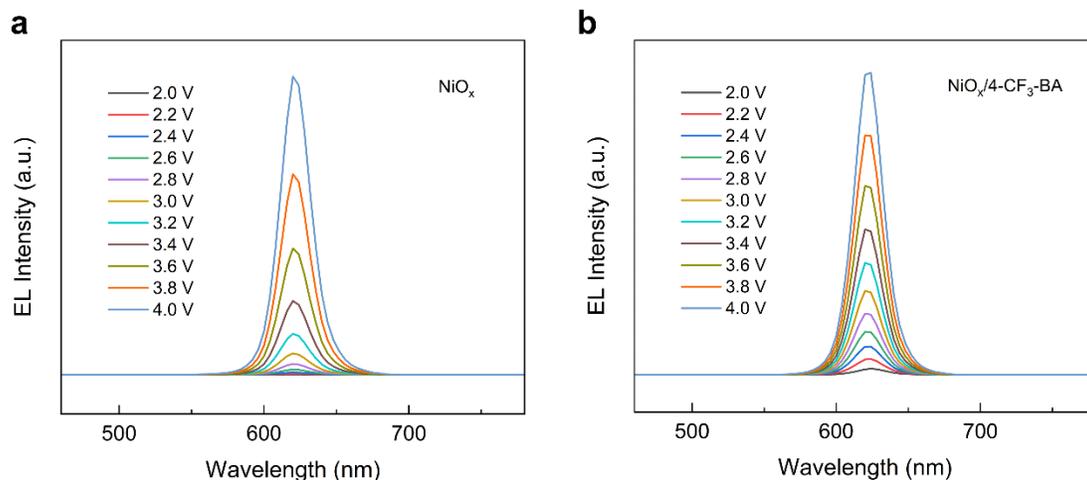
**Figure S4.** Full spectrum diagram of XPS.



**Figure S5.** C 1s core levels of NiO<sub>x</sub> films before and after modifications.



**Figure S6.** Normalized EL and PL spectra of QDs.



**Figure S7.** (a) EL spectra of the QLED with NiO<sub>x</sub> as HIL under different driving voltages. (b) EL spectra of the QLED with NiO<sub>x</sub>/4-CF<sub>3</sub>-BA as HIL under different driving voltages.

**Table S1.** Fractional peak results of XPS.

Peak	Binding Energy (eV)	Peak Area Proportion (%)	
Ni 2p (NiO <sub>x</sub> )	Ni Satellite1	865.19	5.49
	Ni Satellite2	861.09	41.25
	Ni <sup>3+</sup>	855.79	37.12
	Ni <sup>2+</sup>	853.97	16.14
Ni 2p (NiO <sub>x</sub> /4-CF <sub>3</sub> -BA)	Ni Satellite1	865.19	4.88
	Ni Satellite2	861.32	42.10
	Ni <sup>3+</sup>	855.89	39.60
	Ni <sup>2+</sup>	854.08	13.42
O 1s (NiO <sub>x</sub> )	NiO(OH)	531.83	32.53
	Ni(OH) <sub>2</sub>	531.1	35.03
	NiO	529.59	32.44
O 1s (NiO <sub>x</sub> /4-CF <sub>3</sub> -BA)	NiO(OH)	531.8	33.64
	Ni(OH) <sub>2</sub>	531.01	29.03
	NiO	529.57	37.34
C 1s (NiO <sub>x</sub> )	C=O	288.58	13.79
	C-O	286.02	10.58
	C-C	284.82	75.63
C 1s (NiO <sub>x</sub> /4-CF <sub>3</sub> -BA)	C-F	292.46	9.8
	C=O	288.52	14.74
	C-O	285.96	4.63
	C-C	284.81	70.82