

## Support Information

### **High performance, top-emitting, quantum dot light-emitting diodes with all solution-processed functional layers**

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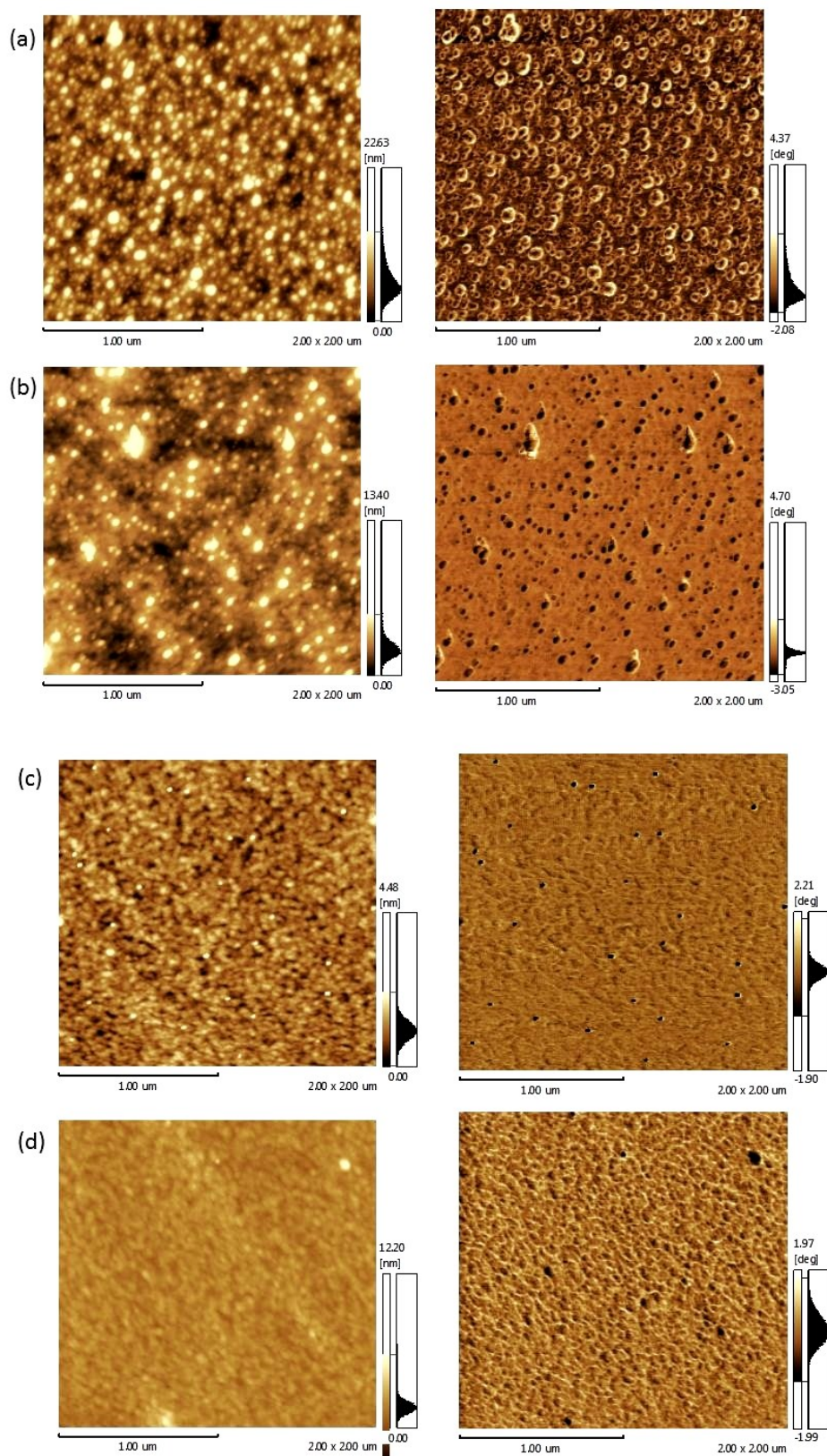
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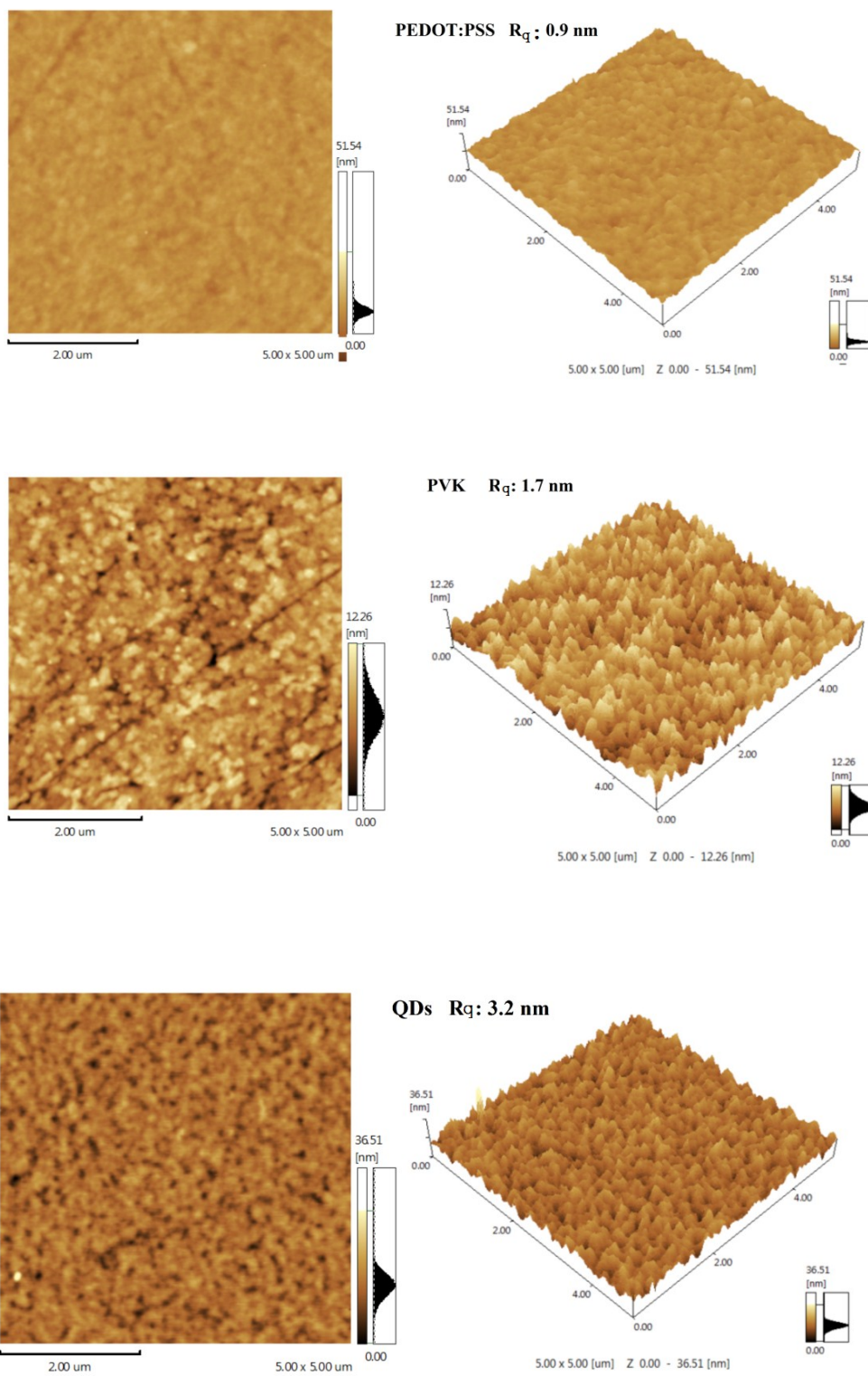
<sup>c</sup>Key Laboratory of Functional Materials Physics and Chemistry of the Ministry of Education, Jilin Normal University, Siping 136000, China

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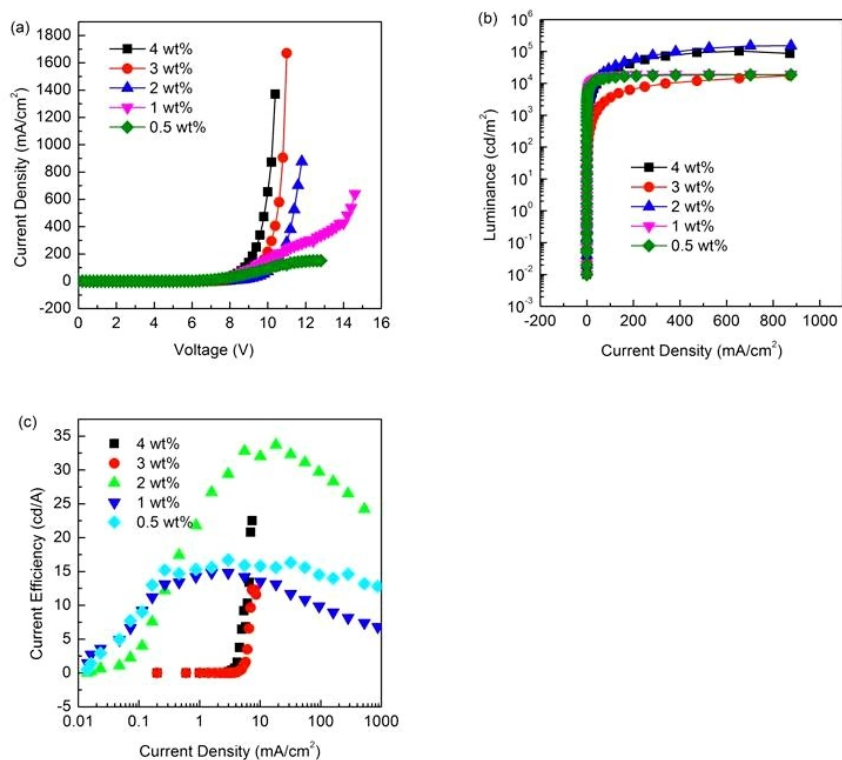
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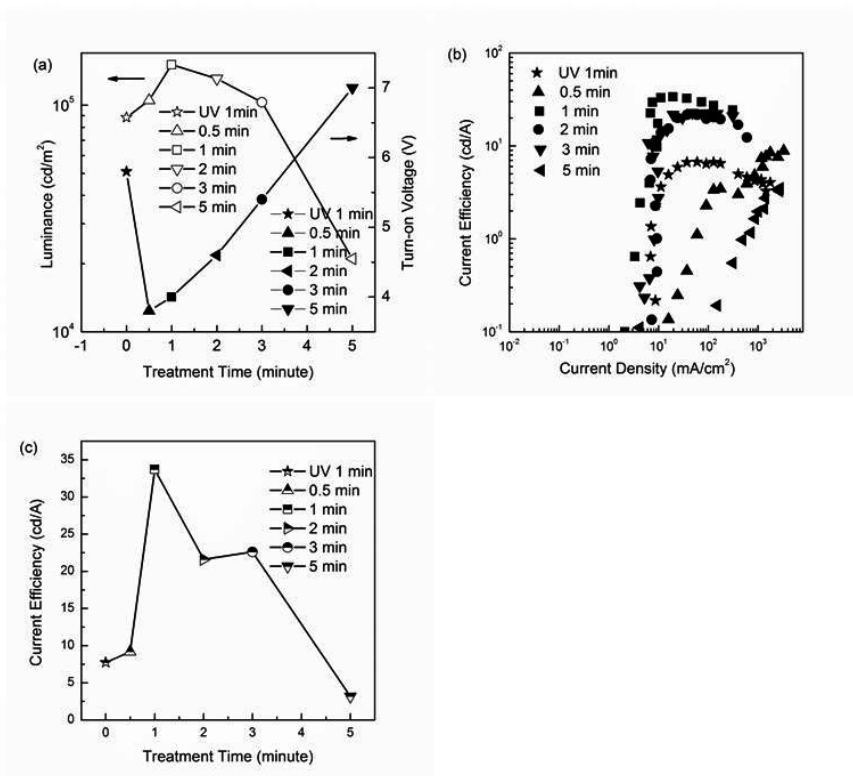
**Figure S1.** The 2  $\mu\text{m} \times 2 \mu\text{m}$  topographic AFM images (left) and phase data (right) of  $\text{MoO}_3$  films over Al under different treatments. (a) Non-treating. (b) UVO treating for 1 min. (c) Ar plasma for 5 min. (d) Ar plasma for 1 min.



**Figure S2.** AFM images of PEDOT:PSS, PVK, QDs films (from top to bottom).



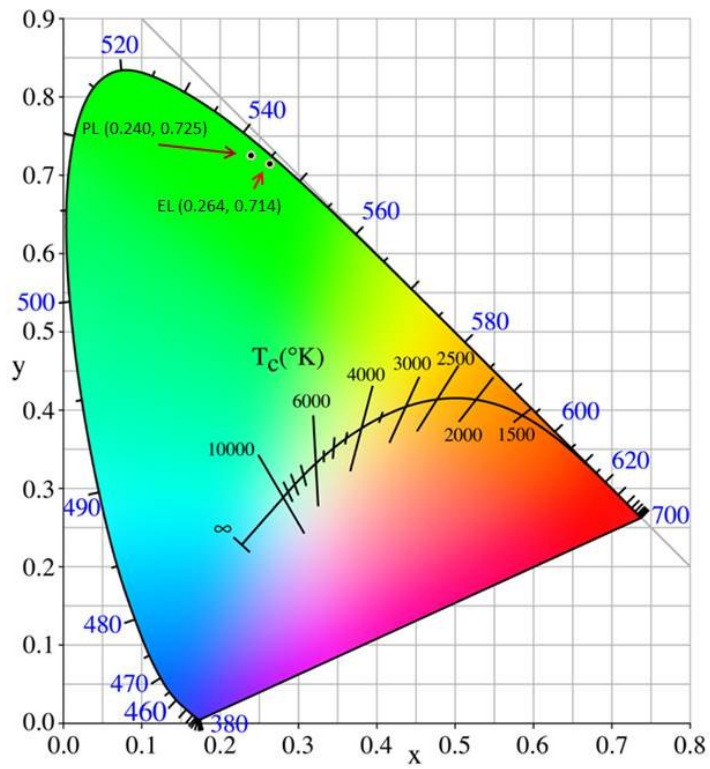
**Figure S3.** The EL curves with various MoO<sub>3</sub> concentrations: 4 wt%, 3 wt%, 2 wt%, 1 wt%, 0.5 wt%. (a) Current density vs voltage. (b) Luminance vs current density. (c) Current efficiency vs current density.



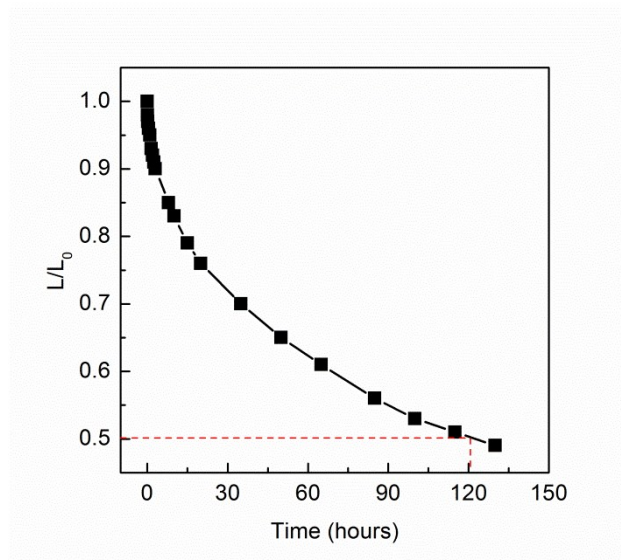
**Figure S4.** (a) The curves of luminance and turn-on voltage vs plasma treatment time. (b) The relationships of current efficiency and current density under various pre-treatment. (c) The maximum current efficiency under different treatment time.



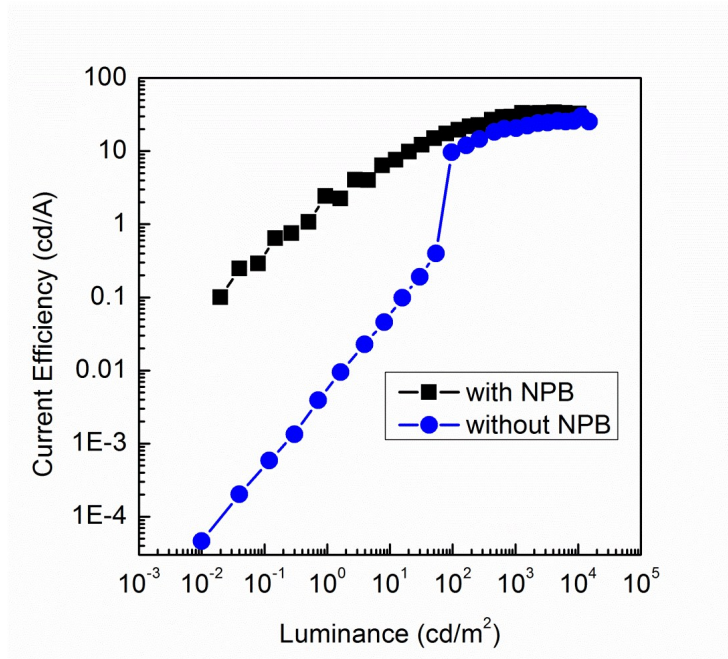
**Figure S5.** The EL brightness photographs of devices with non pre-treatment on Al electrode.



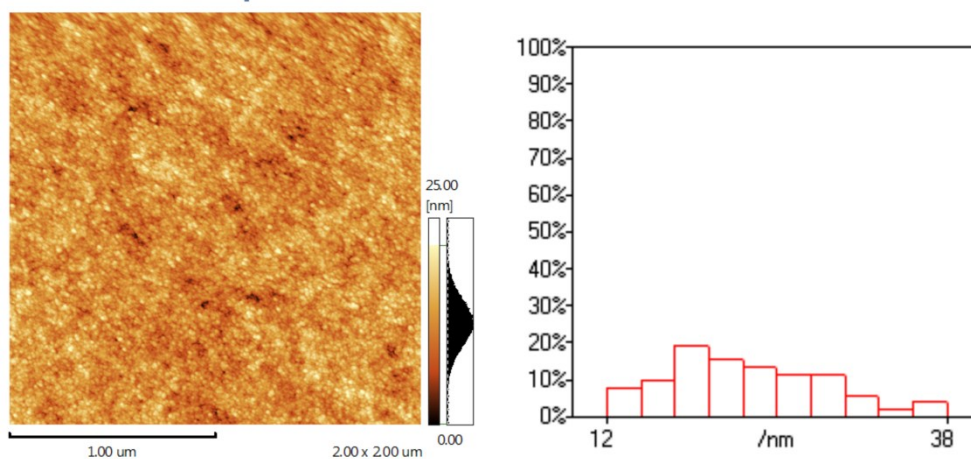
**Figure S6.** 1931 CIE coordinates of PL and EL emissions.



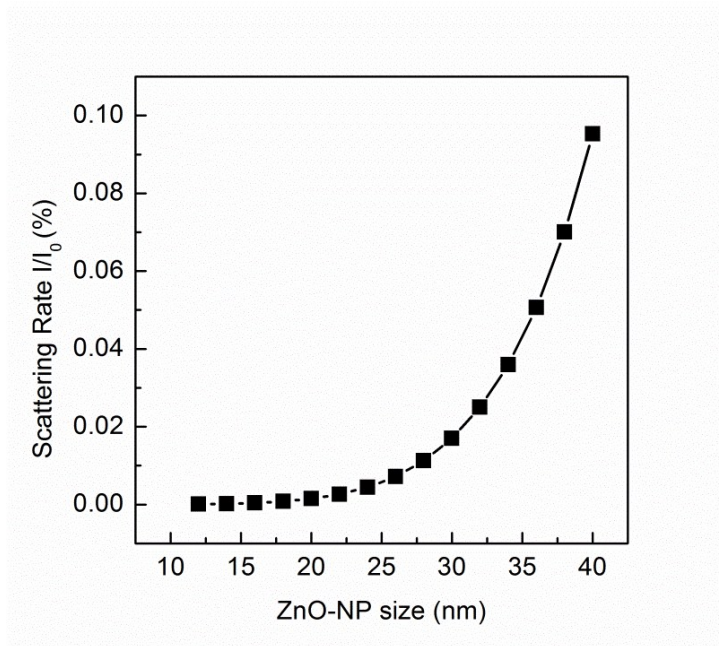
**Figure S7.** Operation lifetime measurement of the green QLED under the initial brightness of 1000 cd/m<sup>2</sup>, showing a T<sub>500</sub> of 122 h and T<sub>50</sub> of 9691 h.



**Figure S8.** Current efficiency of green TE QLEDs (with or without the NPB cladding layer) as a function of luminance.



**Figure S9.** The AFM image of ZnO-NPs film (left); The distribution histogram of ZnO-NPs' particle size (right).

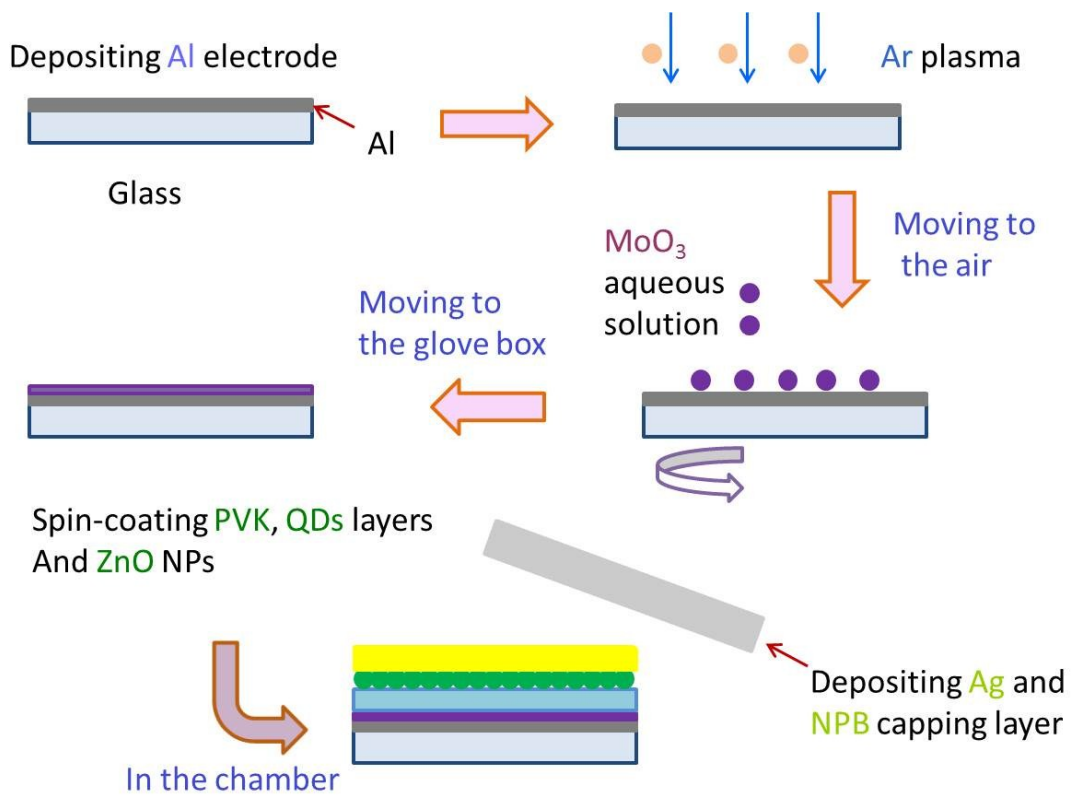


**Figure S10.** The calculated scattering rate as a function of the size of ZnO NPs. The scattering formula is as follows.

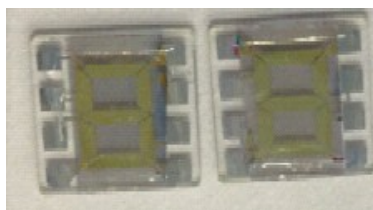
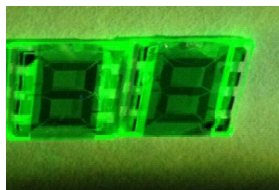
$$\frac{I}{I_0} = \frac{\pi^4 D^6}{4\gamma^2 \lambda^4} \left( \frac{m^2 - 1}{m^2 + 2} \right)^2 (1 + \cos^2 \theta) \times 100\%$$

where, D is particle size,  $\gamma$  is the distance from scattering point,  $\lambda$  is the wavelength,  $\theta$  is the incident angle, m is the refractive index ( $m = 1.65$ , this is the value of ZnO bulk material at 538 nm),  $\theta = 90^\circ$ . The value is calculated under normal incidence.





**Figure S11.** The experiment workflow of preparing TE QLEDs.



**Figure S12.** The sample photographs under ultraviolet light (left) or room light (right).



**Figure S13.** The sample photograph with high brightness.