

**Electronic Supplementary Information for**

**Water-passivated ZnMgO nanoparticles for blue quantum dot light-emitting  
diodes**

Yue Guo,<sup>a</sup> Bochen Liu,<sup>a</sup> Zhao Chen,<sup>\*a</sup> Weidong Song,<sup>\*a</sup> Naifan Tian,<sup>a</sup> Wenhai Wu,<sup>a</sup>  
Xiaokun Fan,<sup>a</sup> Yunfeng Zhan,<sup>a</sup> Fanyuan Meng<sup>a</sup>, Qingguang Zeng<sup>a</sup> and Wai-Yeung  
Wong<sup>\*b,c</sup>

Dr. Y. Guo, B. Liu, Dr. Z. Chen, Dr. W. Song, N. Tian, W. Wu, X. Fan, Dr. Y. Zhan,

Dr. F. Meng and Prof. Q. Zeng

School of Applied Physics and Materials

Wuyi University

22 Dongcheng Village, Jiangmen 529020, P.R. China

E-mail: chenzhao2006@163.com; wdsongwyu@163.com

Prof. W.-Y. Wong

Department of Applied Biology and Chemical Technology and Research Institute for

Smart Energy, The Hong Kong Polytechnic University, Hung Hom, Hong Kong, P.R.

China

Hong Kong Polytechnic University Shenzhen Research Institute, Shenzhen 518057,

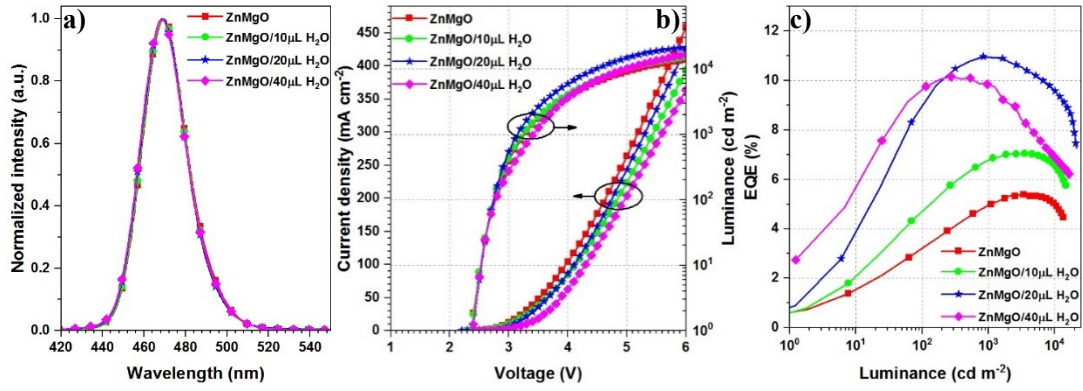
P.R. China.

E-mail: wai-yeung.wong@polyu.edu.hk

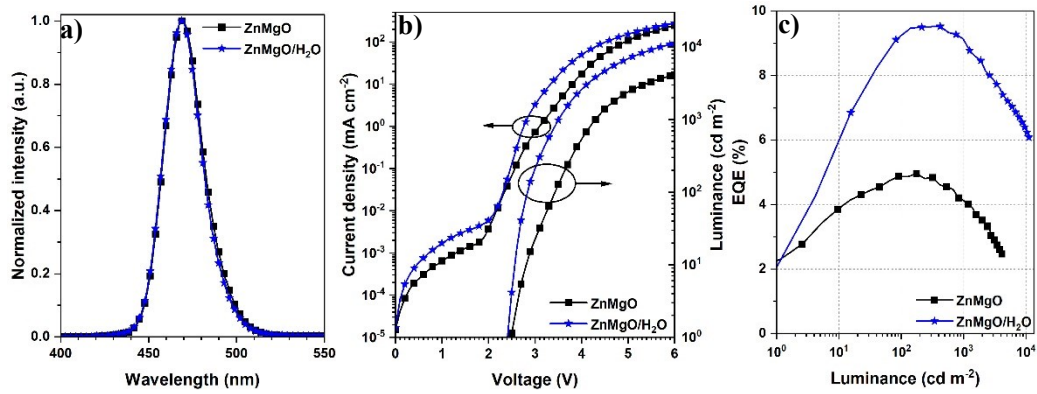
**General information:**

**Materials:** The polymers used as hole injection and transporting materials in this manuscript were all commercially available. PEDOT:PSS and TFB were ordered from Luminescence Technology Corp. (Lumtec) and American Dye Source, Inc (ADS). The blue quantum dot (QD) solution (25 mg mL<sup>-1</sup> in octane) was provided by Suzhou Xingshuo Nanotech Co., Ltd. The core/shell structure of blue QDs was CdZnSe/ZnSeS/ZnS, respectively and oleic acid (OA) was used as the ligand on the surface of ZnS shell.

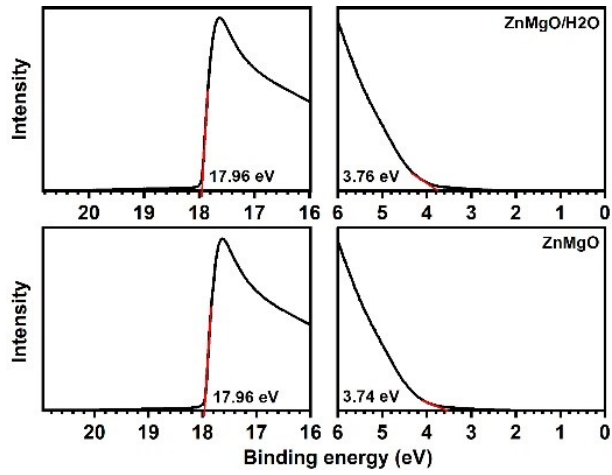
**Preparation of ZnMgO nanoparticles:** Zinc acetate hydrate (1.2 mmol) and magnesium acetate (0.3 mmol) were dissolved into the solution of dimethylsulfoxide (30 mL). Then tetramethylammonium hydroxide (2.5 mmol) in 5 mL ethanol was added into the mixture at room temperature and the mixture was stirred for 1 hour. The nanoparticles were precipitated through adding ethyl acetate and then redispersed in ethanol to prepare the ZnMgO nanoparticle solution (50 mg/mL). For QLED fabrication, the ZnMgO solution was diluted to 20 mg/mL by adding ethanol/H<sub>2</sub>O solutions with different water dosages (0, 10, 20 and 40  $\mu$ L) in 10 mL ethanol.



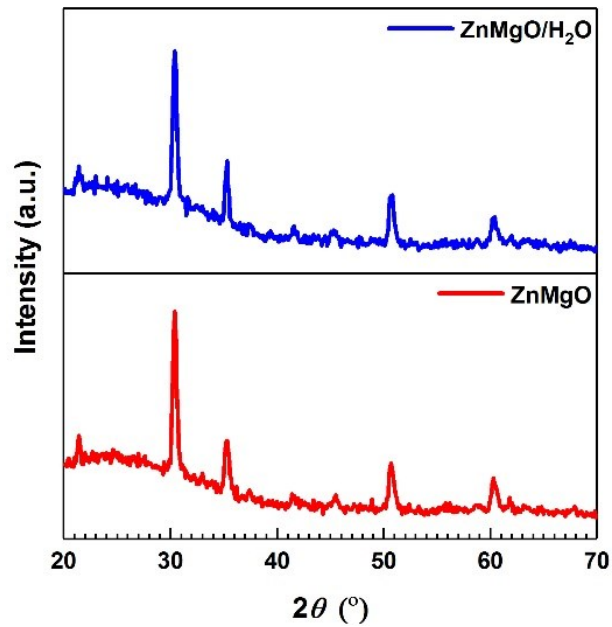
**Figure S1.** The performance of blue QLEDs fabricated by the ZnMgO NPs with different water dosages: a) electroluminescent spectra; b) current density–voltage–luminance curves and c) EQE vs luminance curves.



**Figure S2.** The performance of blue QLEDs fabricated by the ZnMgO and ZnMgO/20  $\mu\text{L}$   $\text{H}_2\text{O}$  NPs after 6 months: a) electroluminescent spectra; b) current density–voltage–luminance curves and c) EQE vs luminance curves.



**Figure S3.** Ultraviolet photoelectron spectrometer (UPS) spectra of ZnMgO films.



**Figure S4.** The powder X-ray diffraction spectra of ZnMgO films.