Supporting Information

TITLE: High Performance Red Phosphorescent Organic Electroluminescent Devices with Characteristic Mechanisms by Utilizing Terbium or Gadolinium Complex as Sensitizer

Rongzhen Cui a, Weiqiang Liu a, Liang Zhou a, •, Xuesen Zhao a, Yunlong Jiang a, Youxuan Zheng b, •, and Hongjie Zhang a, •

a State Key Laboratory of Rare Earth Resource Utilization, Changchun Institute of Applied Chemistry, Chinese Academy of Sciences, Changchun 130022, People’s Republic of China

b State Key Laboratory of Coordination Chemistry, Collaborative Innovation Center of Advanced Microstructures, School of Chemistry and Chemical Engineering, Nanjing University, Nanjing 210023, People’s Republic of China

* Correspondence to: State Key Laboratory of Rare Earth Resource Utilization, Changchun Institute of Applied Chemistry, Chinese Academy of Sciences, Renmin Street 5625, Changchun 130022, People’s Republic of China. Tel.: +86 431 85262127; fax: +86 431 85685653.

E-mail address: zhoul@ciac.ac.cn (L. Zhou), yxzheng@nju.edu.cn (Y. Zheng), hongjie@ciac.ac.cn (H. Zhang).
Figure S1. EL efficiency-current density ($\eta$-$J$) characteristics of co-doped devices based on mCPPO1 with Tb(acac)$_3$(phen-Cl) at different co-doping concentrations. Insert: Brightness-current density-voltage ($B$-$J$-$V$) characteristics of co-doped devices based on mCPPO1 with Tb(acac)$_3$(phen-Cl) at different co-doping concentrations.
Figure S2. EL efficiency-current density ($\eta$-$J$) characteristics of co-doped single-EML devices based on 26DCzPPy with Tb(acac)$_3$(phen-Cl) at different co-doping concentrations. Insert: Brightness-current density-voltage ($B$-$J$-$V$) characteristics of co-doped single-EML devices based on 26DCzPPy with Tb(acac)$_3$(phen-Cl) at different co-doping concentrations.
Figure S3. EL efficiency-current density (η-J) characteristics of co-doped single-EML devices based on 26DCzPPy with Gd(TTA)₃phen at different co-doping concentrations. Insert: Brightness-current density-voltage (B-J-V) characteristics of co-doped single-EML devices based on 26DCzPPy with Gd(TTA)₃phen at different co-doping concentrations.
Figure S4. (a) Normalized PL spectra of 26DCzPPy and EL spectra of Tb(acac)$_3$(phen-Cl) co-doped devices with 50 nm HTL/50 nm ETL (Tb-0.4 wt%), 50 nm HTL/65 nm ETL (device C), and 40 nm HTL/65 nm ETL (device F) at the current density of 10 mA/cm$^2$. Insert: Comparison of the relative intensity of 26DCzPPy emission in these devices. (b) Normalized EL spectra and CIE coordinates of device D with increasing operation voltage.