Supplementary Materials

The Stability of Quantum-dot Light Emitting Diodes with Alkali Metal Carbonates Blending in Mg doped ZnO Electron Transport Layer

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Keywords: Alkali Metal Carbonate, Metal oxide, Mg doped ZnO, Quantum-dot, QLED

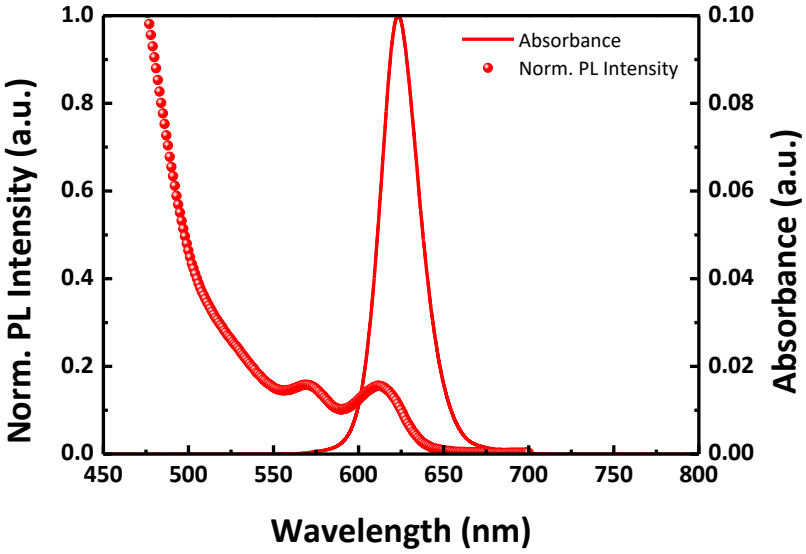
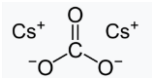
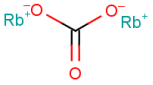
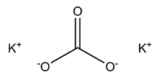
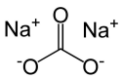
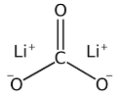


Figure S1. Absorbance and normalized PL characteristics of R-QDs used in this study.

Table S1. Chemical structure, molecular weight, melting point and boiling point characteristics of alkali metal carbonates used in this study.

Alkali Metal Carbonate	**Cs_2CO_3**	**Rb_2CO_3**	**K_2CO_3**	**Na_2CO_3**	**Li_2CO_3**
Chemical structure					
M_w (g/mol)[1)]	325.82	230.945	138.2	105.99	73.89
m.p (°C)[2)]	610	837	891	851	723
b.p (°C)[3)]	N/A	900	N/A	N/A	1310

[1)] M_w: Molecular weight
[2)] m.p: Melting point
[3)] b.p: Boiling point

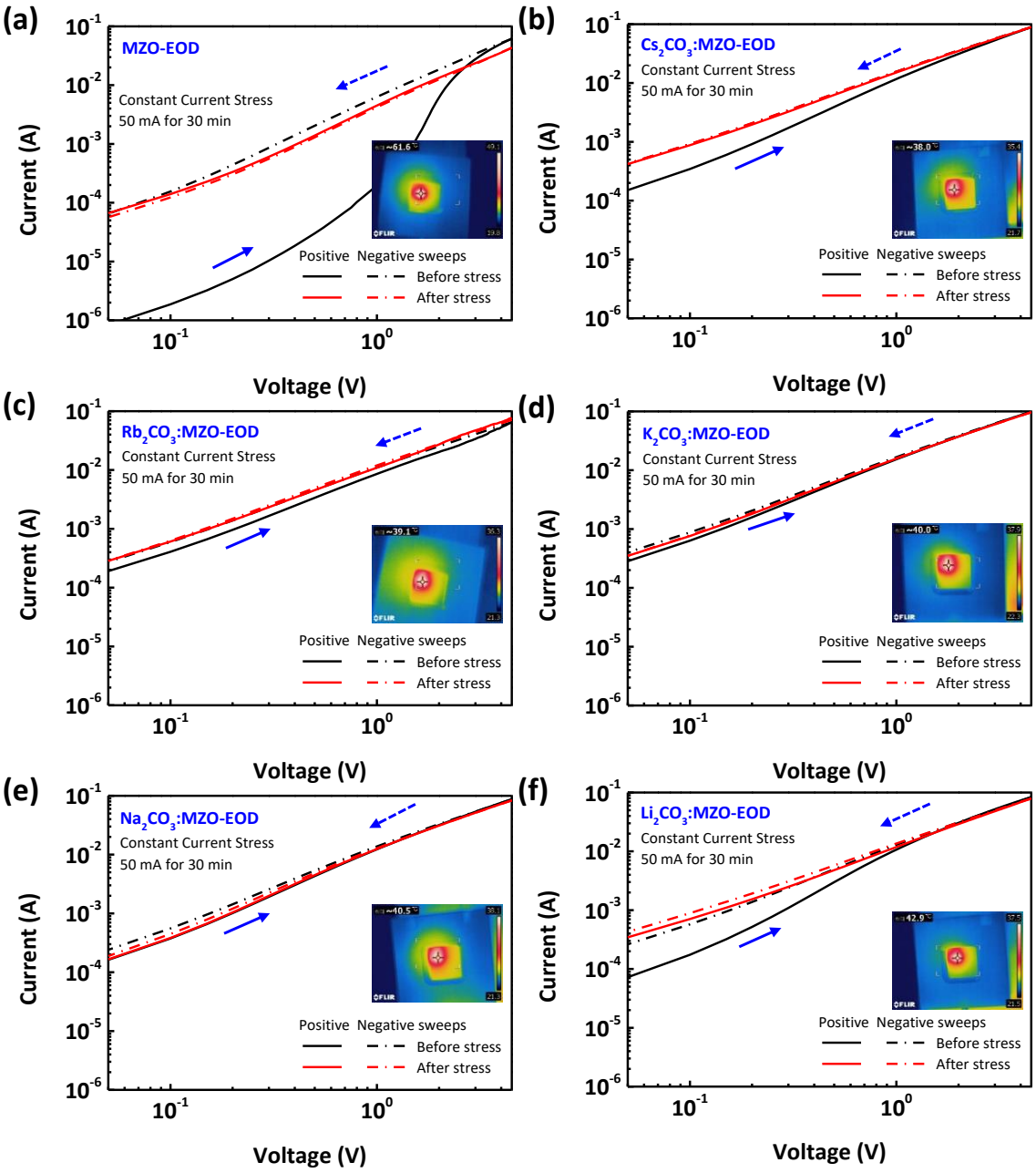


Figure S2. Electrical stability characteristics of EODs with alkali metal carbonate blended MZO ETL and QD EML. Current-voltage characteristic of EODs with (a) MZO, (b) Cs_2CO_3:MZO, (c) Rb_2CO_3:MZO, (d) K_2CO_3:MZO, (e) Na_2CO_3:MZO and (f) Li_2CO_3:MZO ETL. Inset figures exhibit temperature images of each EODs captured by IR camera during the constant current stress. Here, the constant current stress condition at each EODs was fixed as 50 mA for 30 min in 4 mm^2 active area.

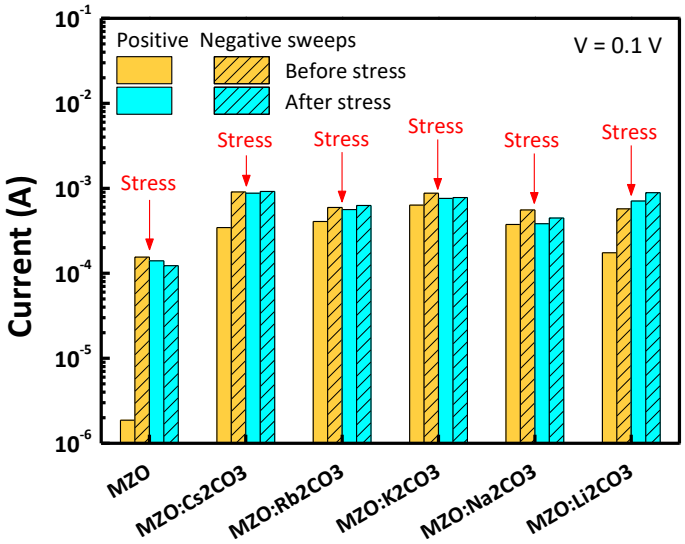


Figure S3. Summarized electrical stability (hysteresis) characteristics of EODs with alkali metal carbonate blended MZO ETLs at 0.1 V before and after current stress (50 mA for 30 min).

Table S2. Summarized lifetime and current efficiency characteristics of inverted R-QLEDs reported in literatures.

Year	Structure	CE[1)] (cd/A)	EL_{peak} (nm)	L_{int} (cd/m²)	Lifetime (@ T_{95}, hr)	Ref.
2013	ITO/AZO:Cs_2CO_3/QDs/TCTA/NPB/HAT-CN/Al	~4.5	630	N/A	N/A	[1]
2015	ITO/ZnO NPs/Cs_2CO_3/QDs/NPB/LG101/Al	~19	620	2000	~20	[2]
2018	ITO/ZnO:Cs_2CO_3/QDs/p-TPD/PEDOT:PSS:Triton X-100/Al	~ 5	622	N/A	N/A	[3]
2018	ITO/ZnO:CsN_3/QDs/TAPC/HAT-CN/MoO_3/Al	N/A	630	N/A	N/A	[4]
2019	ITO/LZO/MZO:Rb_2CO_3/QDs/TCTA/NPB/HAT-CN/Al	~13	623	1,000	~200	[5]
This study	ITO/LZO/MZO:Cs_2CO_3/QDs/TCTA/NPB/HAT-CN/Al	10.1	623	1,000	~407	-
	ITO/LZO/MZO:Rb_2CO_3/QDs/TCTA/NPB/HAT-CN/Al	11.7			~620	

[1)] CE values were measured at high luminance of 50,000 cd/m².

References

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