

Supporting information

A Hybrid Inorganic–Organic Light-Emitting Diode using Ti-doped ZrO₂ as an Electron-Injection Layer

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Table S1: Summary of device performances 1-4 and other recently reported green emitting devices

Electron injection materials	L (cd/m²)	V (V)	η_c (cd A⁻¹)	η_p (lm W⁻¹)	Reference
ZnO /F8BT	8600	6.0	1.5	-	19
TiO ₂ /F8BT	805	10.6	0.03	-	30
PE/Al	1964	0.82	-	-	69
ZrO ₂ /redF	3450	11.8	0.47	0.18	30
ZrO ₂ /L-green	4560	11.8	1.01	0.41	30
ZrO ₂ /L-Blue	470	13.2	0.12	0.03	30
ZrO ₂ / F8BT	25970	9.0	2.71	1.02	30
ZrO ₂ /PFO	309	9.2	0.03	0.015	30
PE/Ag	1689	0.80	-	-	30
TiO ₂ /F8BT	805	10.6	0.03	0.01	30
TiO ₂ /redF	168	12.4	0.01	0.003	30
TiO ₂ /L-green	2.9	10.8	0.0002	0.00007	30
TiO ₂ /L-Blue	5.1	14.8	0.0007	0.0002	30
TiO ₂ / F8BT	805	10.6	0.03	0.01	30
TiO ₂ /PFO	0.1	12.8	0.000005	0.000001	30
Ti-ZrO ₂ (1%)	24230	8.6	1.93	1.03	This work
Ti-ZrO ₂ (2%)	24948	7.2	2.84	1.32	This work
Ti-ZrO ₂ (3%)	26432	7.0	2.04	1.15	This work
Ti-ZrO ₂ (4%)	26996	6.5	2.41	1.23	This work

Reference

- [19] M. Takada, S. Furuta, T. Kobayashi, T. Nagase, T. Shinagawa, M. Izaki and H. Naito, *J. Appl. Phys.* 2016, **120**, 185501-6.
- [30] N. Tokmoldin, N. Griffiths, Donal D. C. Bradley and Saif A. Haque, *Adv. Mater.* 2009, **21**, 3475-3478.
- [69] S. Stolz, Y. Zhang, U. Lemmer, G. H. Sosa and H. Aziz, *ACS Appl. Mater. Interfaces.* 2017, **9**, 2776-2785.

Figure S1. ¹H NMR spectrum of 5-(1-(naphthalene-1-yl)-1H-phenanthro[9,10-d]imidazole-2-yl) benzene-1,2,3-triol (NPIBT)

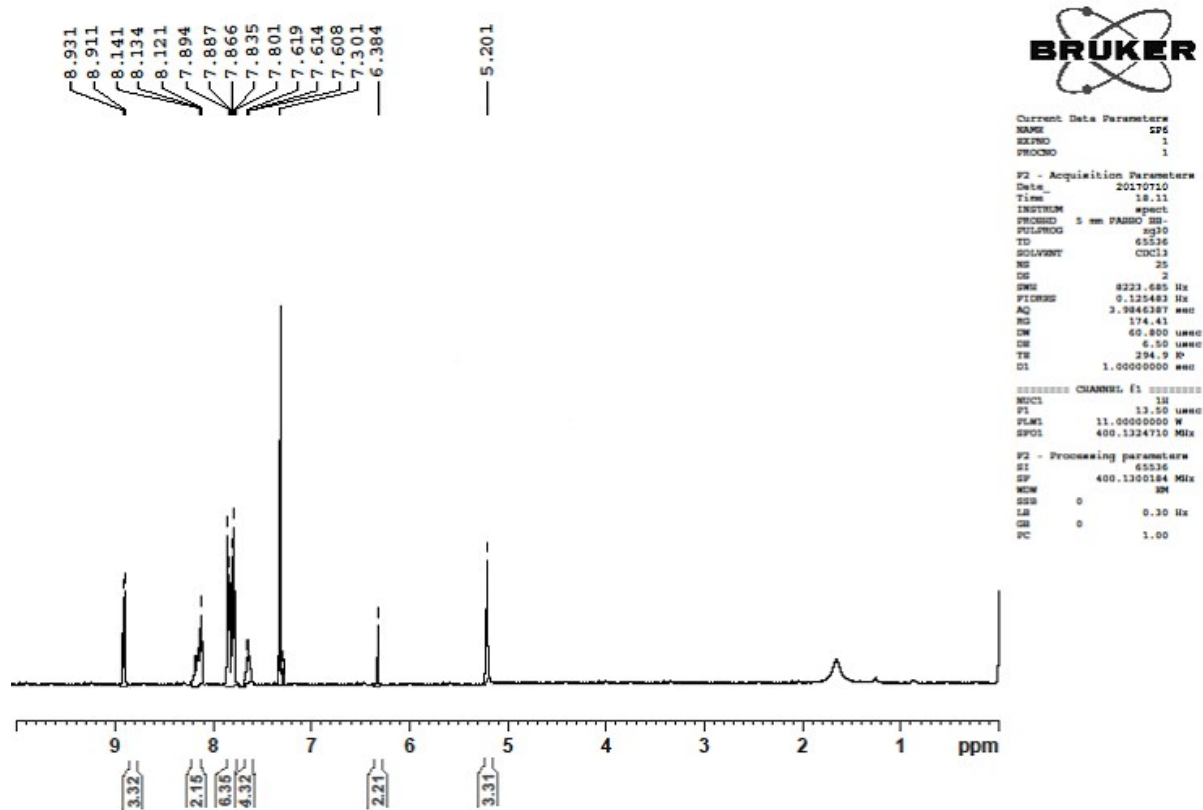


Figure S2. ¹³C NMR spectrum of 5-(1-(naphthalene-1-yl)-1H-phenanthro[9,10-d]imidazole-2-yl) benzene-1,2,3-triol (NPIBT)

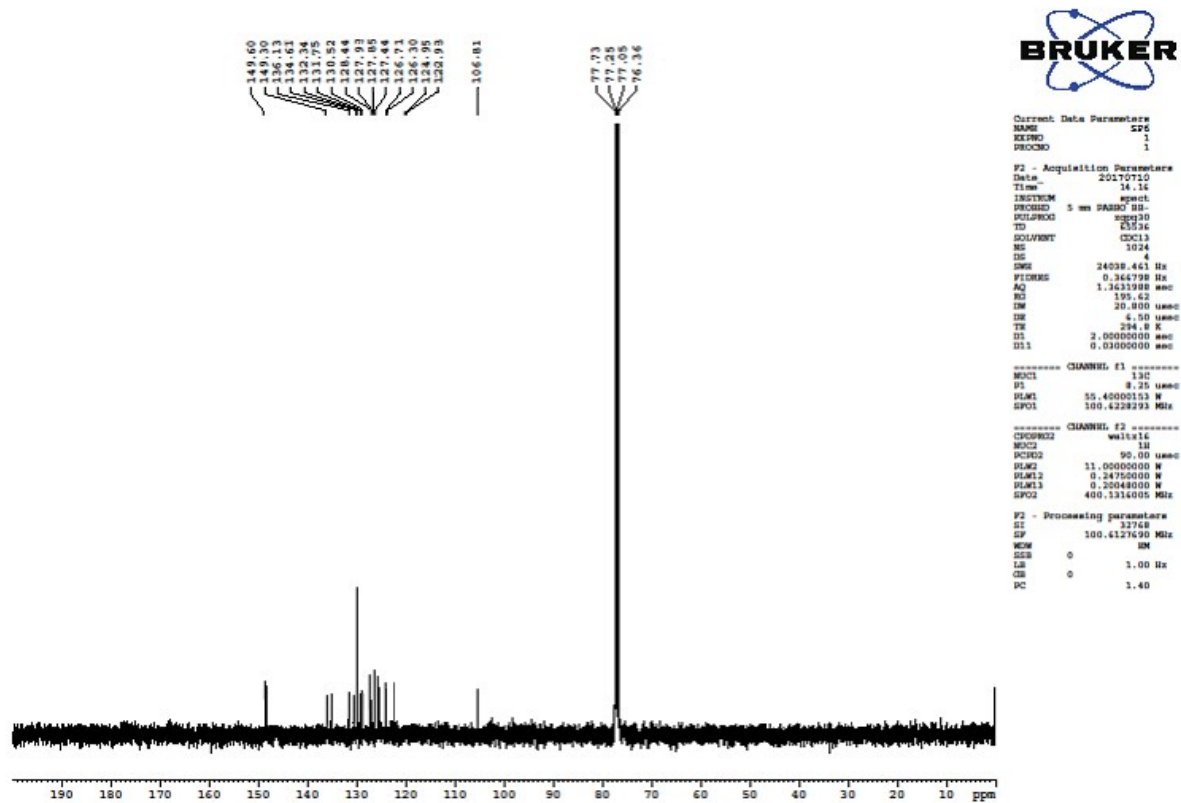


Figure S3. ¹H NMR spectrum of iridium(III)-bis-5-(1-(naphthalene-1-yl)-1H-phenanthro[9,10-d]imidazole-2-yl) benzene-1,2,3-triol (acetylacetonate) [Ir(NPIBT)₂(acac)]

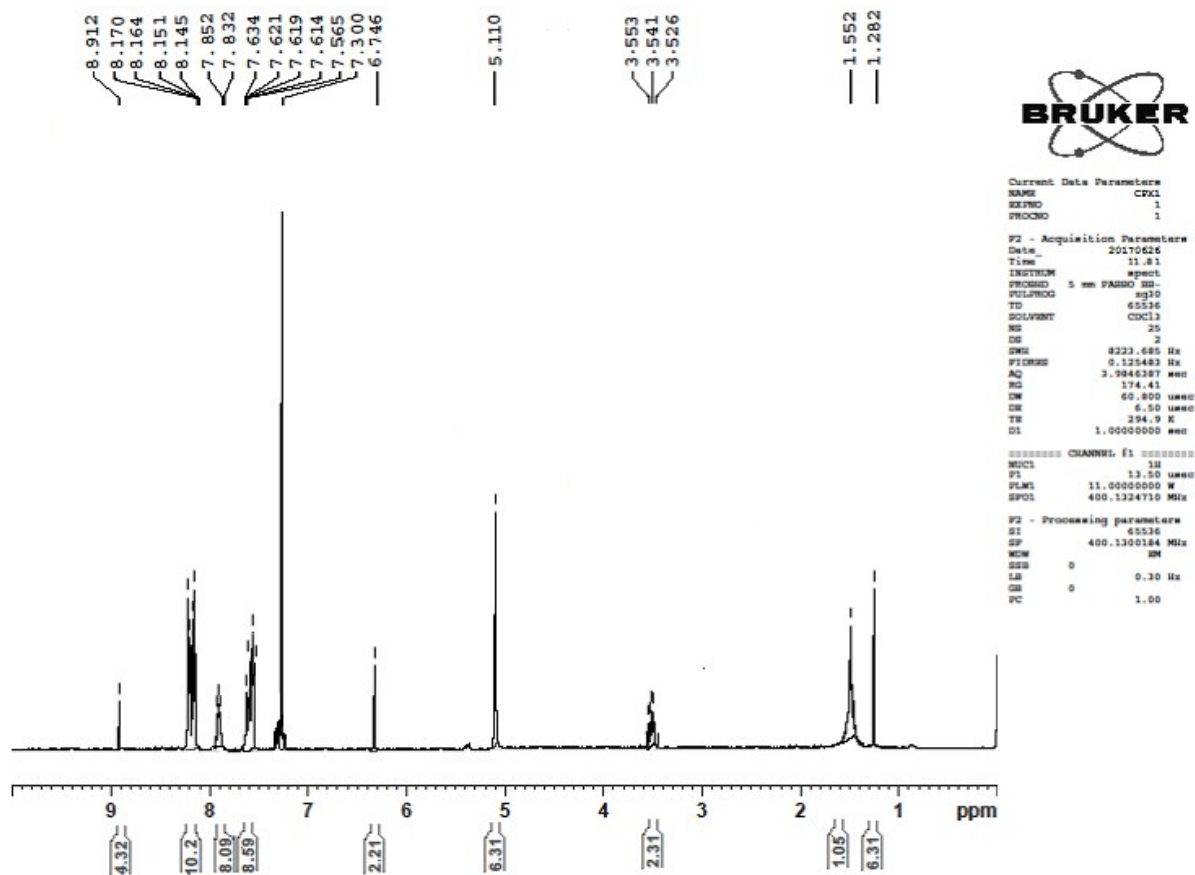


Figure S4. ¹³C NMR spectrum of iridium(III)-bis-5-(1-(naphthalene-1-yl)-1H-phenanthro[9,10-d]imidazole-2-yl) benzene-1,2,3-triol (acetylacetonate) [Ir(NPIBT)₂(acac)]

