SUPPLEMENTARY INFORMATION

Effects of hole transport layer on the performance of sky-blue Dion-Jacobson perovskite light-emitting diodes

Wen Ting Sun,1 Yanling He,1 Muhammad Umair Ali,1 Qiye Liu,2 Hongbo Mo,1 Sijia Wang,3 Alan Man Ching Ng,4 and Aleksandra B. Djurišić1,*

1 Department of Physics, The University of Hong Kong, Pokfulam Road, Hong Kong
2 Shenzhen Institute for Quantum Science and Engineering, and Department of Physics, Southern University of Science and Technology, Shenzhen 518055, China
3 Department of Mechanical Engineering, The University of Hong Kong, Pokfulam Road, Hong Kong
4 Core Characterization Facility, Southern University of Science and Technology, No. 1088, Xueyuan Rd., Shenzhen, 518055, Guangdong, PR China.

Figure S1. PL spectra of perovskites with 45% DDABr2 and different content of MDABr2.

Figure S2. SEM images of DDA-MDA perovskite on different HTLs: a) 2PACz, b) 2PACz/PVK and c) 2PACz/PVK/TSP01.
Figure S3. Space-charge-limited current (SCLC) measurement of electron-only device with the architecture ITO/SnO₂/PEIE/DDA-MDA perovskite/TPBi/Liq/Al.

Figure S4. SCLC measurement of DDA-MDA perovskite-based LED devices with different HTLs: a) 2PACz, b) 2PACz/PVK, and c) 2PACz/PVK/TSP01. Device architecture was ITO/HTL/Perovskite/CBP/MoO₃/Al, where CBP denotes 4,4’-bis(N-carbazolyl)-1,1’-biphenyl.
Figure S5. TRPL decay curves of perovskite films on different HTLs.

Table S1. Fitting parameters of TRPL curves to exponential decay model described as $I(t) = \Sigma_i A_i \exp(-t/\tau_i)$, with average decay time calculated as $\tau_{avg} = \Sigma_i A_i \tau_i / \Sigma_i A_i$.

<table>
<thead>
<tr>
<th>HTL</th>
<th>$A_1$</th>
<th>$\tau_1$ (ns)</th>
<th>$A_2$</th>
<th>$\tau_2$ (ns)</th>
<th>$\tau_{avg}$ (ns)</th>
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<tbody>
<tr>
<td>2PACz</td>
<td>0.94</td>
<td>1.52</td>
<td>-</td>
<td>-</td>
<td>1.52</td>
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<tr>
<td>2PACz/PVK</td>
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<td>1.16</td>
<td>0.23</td>
<td>4.00</td>
<td>1.83</td>
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<tr>
<td>2PACz/PVK/TSP01</td>
<td>0.60</td>
<td>1.18</td>
<td>0.36</td>
<td>4.26</td>
<td>2.34</td>
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Figure S6. The luminance of devices as a function of time at a fixed current bias of 0.2 mA (corresponding to initial luminance in the range 90-99 cd/m²).
Figure S7. a) Fermi edge of 2PACz and 2PACz/PVSK, b) Fermi edge of 2PACz, 2PACz/PVK and 2PACz/PVK/PVSK, c) Fermi edge of 2PACz, 2PACz/PVK, 2PACz/PVK/TSPO1 and 2PACz/PVK/TSPO1/PVSK, d) SE Cut-off of 2PACz and 2PACz/PVSK, e) SE Cut-off of 2PACz, 2PACz/PVK and 2PACz/PVK/PVSK and f) SE Cut-off of 2PACz, 2PACz/PVK, 2PACz/PVK/TSPO1 and 2PACz/PVK/TSPO1/PVSK.