Electronic Supporting Information

Mn-Doped CsPbCl$_3$ Perovskite Nanocrystals: Solvothermal Synthesis, Dual-Color Luminescence and Improved Stability

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Table S1 Determination of Cs, Pb, Mn and Cl mole contents from EDX data for the Mn-doped CsPbCl$_3$ NCs with different Mn-to-Pb feeding ratios (0:1, 2:1, 6:1, 10:1).

<table>
<thead>
<tr>
<th></th>
<th>Cs</th>
<th>Pb</th>
<th>Mn</th>
<th>Cl</th>
<th>Cs: (Pb+Mn): Cl</th>
<th>Mn: (Pb+Mn)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0:1</td>
<td>0.234</td>
<td>0.245</td>
<td>0.711</td>
<td>1: 1.05: 3.04</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>2:1</td>
<td>0.259</td>
<td>0.221</td>
<td>0.002</td>
<td>0.791</td>
<td>1: 0.86: 3.05</td>
<td>0.01</td>
</tr>
<tr>
<td>6:1</td>
<td>0.252</td>
<td>0.196</td>
<td>0.073</td>
<td>0.821</td>
<td>1:1.07: 3.26</td>
<td>0.27</td>
</tr>
<tr>
<td>10:1</td>
<td>0.278</td>
<td>0.178</td>
<td>0.114</td>
<td>0.815</td>
<td>1: 1.05: 2.93</td>
<td>0.39</td>
</tr>
</tbody>
</table>
Figure S1 XRD patterns of samples prepared with high Cs-to-Pb feeding ratio (1.5:1 and 1.8:1) and fixed Mn-to-Pb feeding ratio of 6:1.
Figure S2 PL decay curves of Mn$^{2+}$ luminescence ($\lambda_{\text{em}}=600$ nm, assigned to Mn$^{2+}$:
$^4T_1 \rightarrow ^6A_1$ transition) in the Mn-doped CsPbCl$_3$ NCs synthesized with different Mn-to-Pb feeding ratios (2:1, 6:1, 10:1).
Figure S3 Excitation-emission mapping for the as-prepared Mn-doped CsPbCl$_3$ NCs, showing the excitation wavelength independent emissions for both exciton and Mn$^{2+}$. 
Figure S4  Quantitative excitation and emission spectra ($\lambda_{ex}=345$ nm) of the reference and Mn-doped CsPbCl$_3$ NCs with different Mn-to-Pb feeding ratio recorded by a spectrofluorometer equipped with an integrating sphere for PLQY measurement.
Figure S5 PL decay curves of Mn\(^{2+}\) luminescence in Mn-doped CsPb(Cl/Br)_3 NCs prepared via Cl-to-Br anion exchange.
**Figure S6** EL spectra of WLED as a function of operating current.
Figure S7 EL spectra of WLED as a function of different working time intervals.
Figure S8 PL spectra of Mn-doped CsPb(Cl/Br)$_3$ NCs recorded with elevation of temperature from 298 K to 335 K.
Figure S9 PL spectra of Mn-doped CsPb(Cl/Br)$_3$ NCs recorded with decrease of temperature from 335 K to 298 K.
**Figure S10** Temperature-induced switching of FIR between exciton emission and Mn one (alternating between 335 K and 298 K).