Supporting Information

High-Quality Organoalide Lead Perovskite Films Fabricated with Layer-by-Layer Alternating Vacuum Deposition for High Efficiency Photovoltaics

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Figure S1. Schematic of the TSD and LBLA evaporation processes of perovskite film. The yellow, white, and brownish colors correspond to PbI$_2$, MAI, and Perovskite films, respectively.
Figure S2. Statistical distribution diagrams of perovskite grain size for both LBLA (a) and TSD (b) methods.
**Table S1.** Fitting parameters of the corresponding PL decay curves

<table>
<thead>
<tr>
<th>Perovskite film on</th>
<th>$\tau$ (ns)</th>
<th>$\beta_l$</th>
<th>$\chi$</th>
</tr>
</thead>
<tbody>
<tr>
<td>LBLA</td>
<td>25.6</td>
<td>1568.7</td>
<td>1.14</td>
</tr>
<tr>
<td>TSD</td>
<td>16.3</td>
<td>1147.3</td>
<td>1.06</td>
</tr>
</tbody>
</table>