Supporting information

Unequal bonding in Ag-CuIn₃Se₅-based solid solutions responsible for reduction in lattice thermal conductivity and improvement in thermoelectric performance

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Fig. S1 (a-e) EPMA mapping of five elements, Cu, In, Se, Ag and Te on polished Cu$_{0.8}$Ag$_{0.2}$In$_3$Se$_{4.9}$Te$_{0.1}$ surface; (f) A SEM image, where an average grain size of 10~15 μm was observed; (g) EDAX analysis of the chemical compositions.
Table S1 The chemical compositions of the sample Cu$_{0.8}$Ag$_{0.2}$In$_3$Se$_{4.9}$Te$_{0.1}$ determined using EDAX.

<table>
<thead>
<tr>
<th>Composition</th>
<th>Cu</th>
<th>In</th>
<th>Se</th>
<th>Te</th>
<th>Ag</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cu$<em>{0.8}$Ag$</em>{0.2}$In$<em>3$Se$</em>{4.9}$Te$_{0.1}$</td>
<td>0.81</td>
<td>2.95</td>
<td>4.90</td>
<td>0.06</td>
<td>0.17</td>
</tr>
</tbody>
</table>

Fig. S2 Raman spectra of Cu$_{1-x}$Ag$_x$In$_3$Se$_{4.9}$Te$_{0.1}$ ($y=0.05$, 0.1, 0.2 and 0.3) samples. The Raman spectrum of CuIn$_3$Se$_5$ is presented for comparison.