Supporting information

Enhanced thermoelectric properties of SnSe thin films grown by single-target magnetron sputtering

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**Fig. S1** XRD pattern of SnSe sputtering target (Co Kα radiation, λ = 1.79 Å). The inset shows the picture of the as-synthesized SnSe target.

**Fig. S2** In-house in situ XRD patterns using contour plot for the annealed thin film samples (a) ss_600 and (b) ss_800.
Fig. S3 SEM images of the surfaces of the annealed SnSe thin film samples (a) ss_600, (b) ss_700, (c) ss_800, and (d) ss_1000.

Table S1 Actual compositions of the as-deposited thin film measured by SEM-EDS.

<table>
<thead>
<tr>
<th>Measured regions</th>
<th>Sn (at.%)</th>
<th>Se (at.%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1</td>
<td>52.23</td>
<td>47.77</td>
</tr>
<tr>
<td>#2</td>
<td>52.66</td>
<td>47.34</td>
</tr>
<tr>
<td>#3</td>
<td>52.19</td>
<td>47.81</td>
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<td>47.81</td>
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<tr>
<td>#5</td>
<td>52.30</td>
<td>47.70</td>
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<tr>
<td>#6</td>
<td>52.08</td>
<td>47.92</td>
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<tr>
<td>Average</td>
<td>52.275</td>
<td>47.725</td>
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</tbody>
</table>
Fig. S4 Temperature-dependent thermoelectric properties: (a) electrical resistivity, (b) Seebeck coefficient and (c) power factor in four cycles of both heating and cooling for the annealed thin film sample (ss_700).

Fig. S5 Temperature-dependent thermoelectric properties: (a) electrical resistivity, (b) Seebeck coefficient and (c) power factor for the annealed thin film sample (ss_600) in comparison with the annealed thin film sample (ss_700).

Fig. S6 Temperature-dependent thermoelectric properties: (a) electrical resistivity, (b) Seebeck coefficient and (c) power factor for the annealed thin film sample (ss_800) in comparison with the annealed thin film sample (ss_700).
Fig. S7 Temperature-dependent thermoelectric properties: (a) electrical resistivity, (b) Seebeck coefficient and (c) power factor for the annealed thin film sample (ss_1000) in comparison with the annealed thin film sample (ss_700).