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Supporting Information

Facile Microwave-Assisted Hydrothermal Synthesis of SnSe: Impurity Removal and Enhanced Thermoelectric Properties

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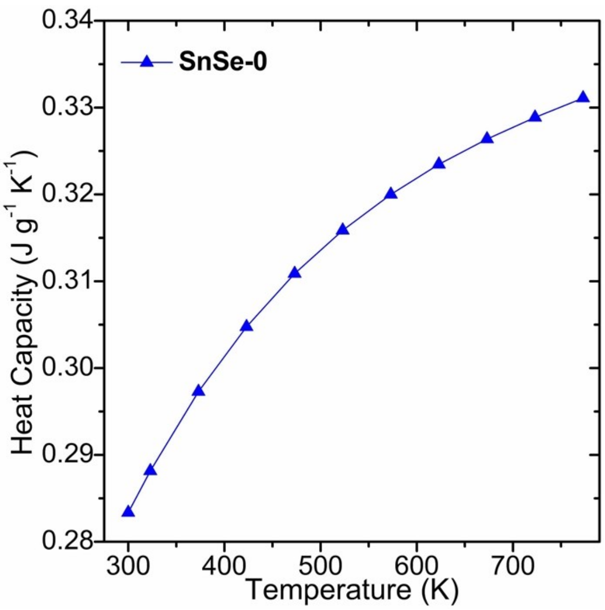

Fig. S1 Calculated heat capacity (C_p) of SnSe-0 pellet as a function of temperature.

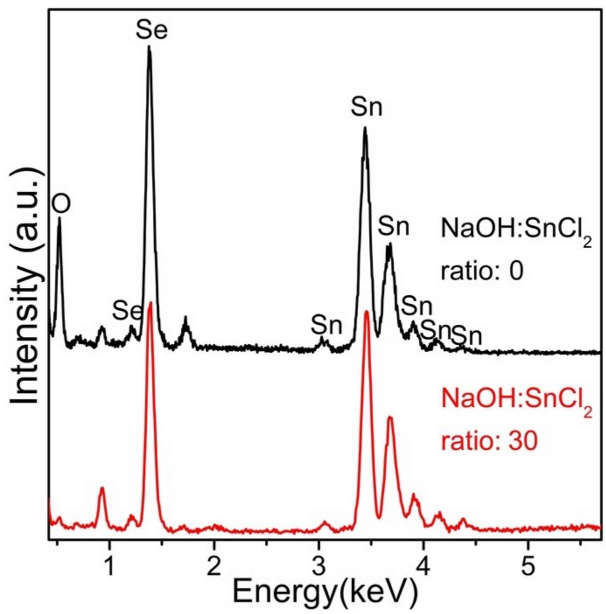

Fig. S2 EDS spectra of SnSe rods synthesised with the NaOH:$SnCl_2$ molar ratio of 0 and 30.

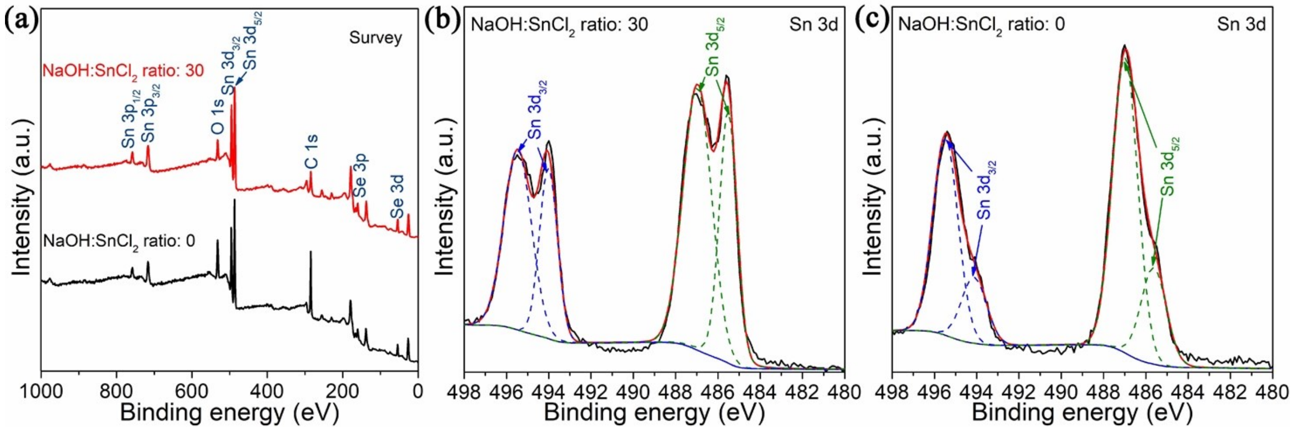

Fig. S3 XPS spectra of hydrothermal samples synthesised with NaOH:$SnCl_2$ molar ratios of 0 and 30: (a) survey scans, (b,c) high-resolution Sn 3d scans.

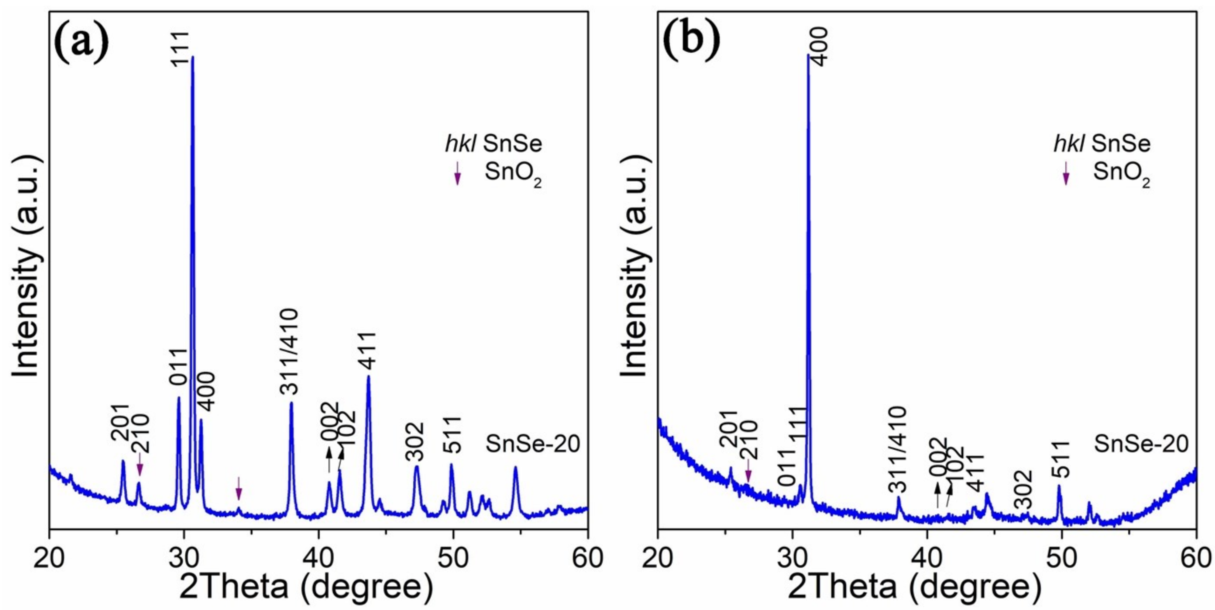

Fig. S4 XRD patterns of SnSe-20 pellet along (a) parallel and (b) perpendicular to the pressing direction, respectively.

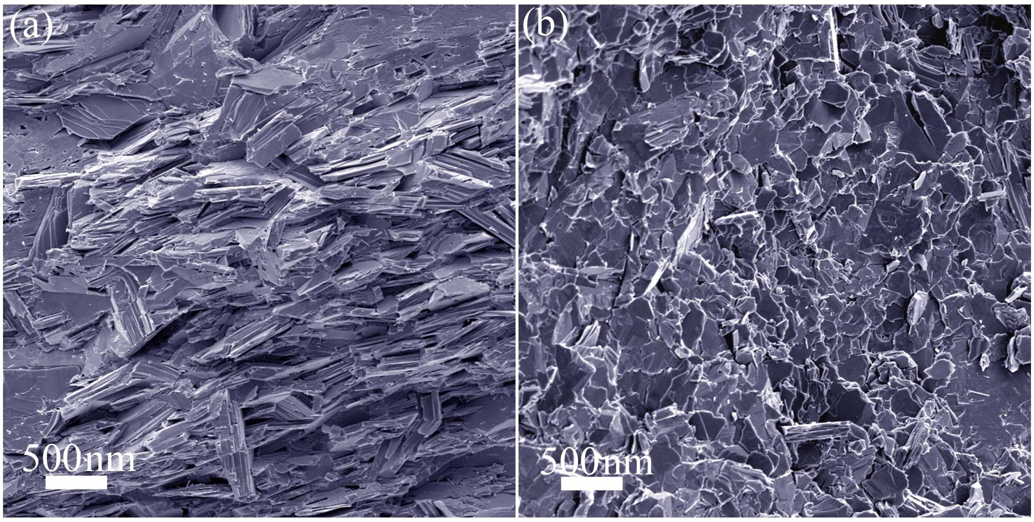

Fig. S5 SEM images collected from the fractured surface along (a) parallel and (b) perpendicular to the pressing direction, respectively.

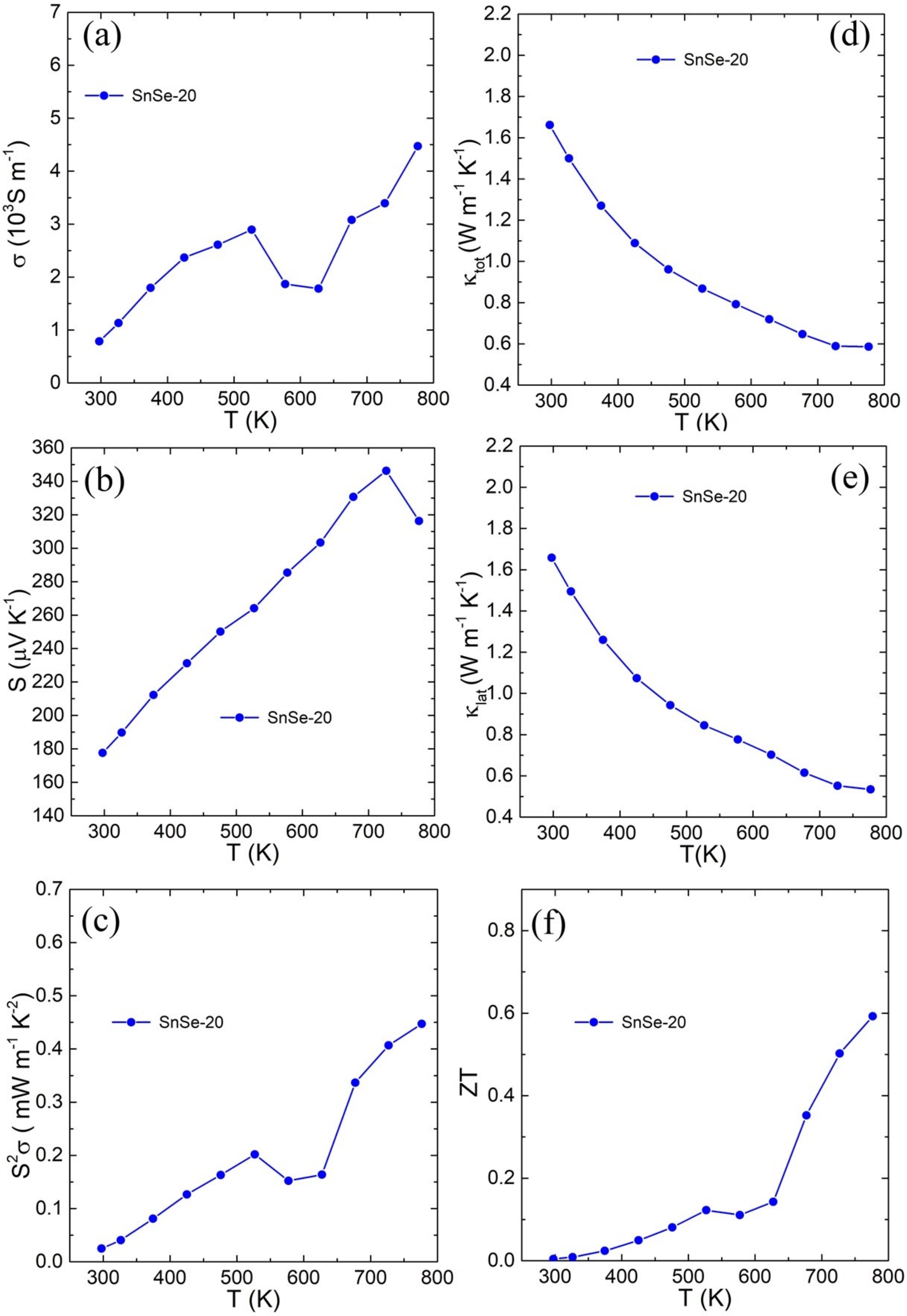

Fig. S6 Thermoelectric properties of SnSe-20 pellet: (a) electrical conductivity (σ), (b) Seebeck coefficient (S), (c) power factors ($S^2\sigma$), (d) total thermal conductivity (κ), (e) lattice thermal conductivity (κ_L), (f) ZT.

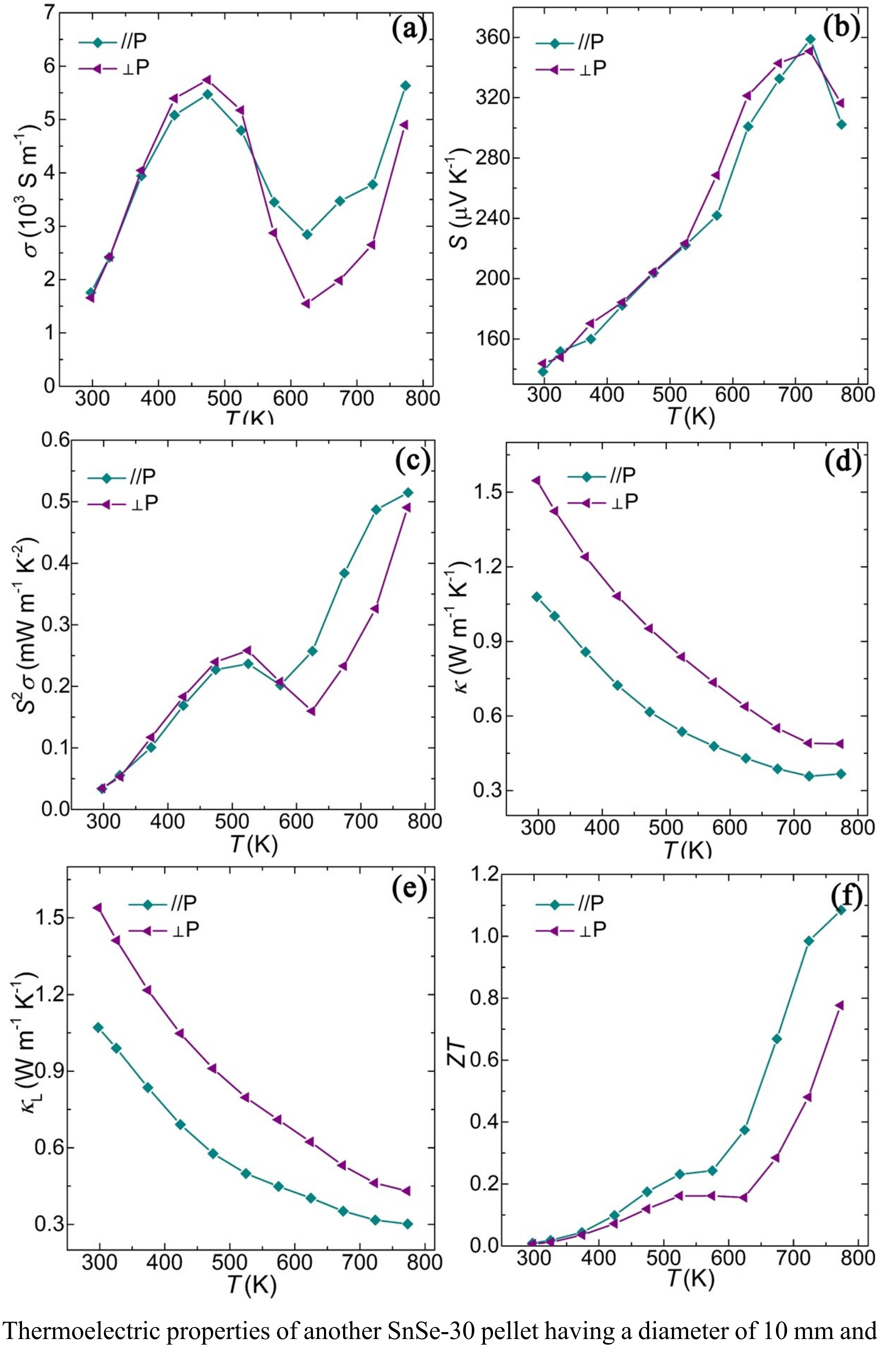

Fig. S7 Thermoelectric properties of another SnSe-30 pellet having a diameter of 10 mm and a height of 10 mm: (a) electrical conductivity (σ), (b) Seebeck coefficient (S), (c) power factors ($S^2\sigma$), (d) total thermal conductivity (κ), (e) lattice thermal conductivity (κ_L), (f) ZT. "⊥P" and "//P" represent along perpendicular and parallel to the pressing directions, respectively.

Table S1 A summary on solution synthesis methods, synthesis conditions and *ZT* values of solution-synthesised binary SnSe materials

Synthesis method	Solvent	Reaction temperature	Reaction duration	Se precursor concentration	*ZT*	*T*[a)]	Ref.
Microwave-assisted hydrothermal	H_2O	403 K	30 min	10 mmol	1.08 (//P)	773 K	This work
Microwave-assisted hydrothermal	H_2O	403 K	30 min	10 mmol	0.78 (⊥P)	773 K	This work
Hydrothermal	H_2O	403 K	36 h	N.A.	0.71	773 K	1
					1.18	873 K	
Solvothermal	Ethylene glycol + hydrazine hydrate	433 K	12 h	3 mmol	~0.6	773 K	2
Solvothermal	Ethylene glycol + hydrazine hydrate	473 K	12 h	1 mmol	~0.81	773 K	3
Microwave-assisted solvothermal	Ethylene glycol	503 K	10 min	1 mmol	~0.97	800 K	4
Solvothermal	Ethanolamine	473 K	24 h	1 mmol	~0.83	803 K	5
Solvothermal	Ethylene glycol + H_2O	503 K	36 h	N.A.	~1.36	823 K	6
					~1.0	773 K	
Aqueous solution method	H_2O	403 K	2 h	10 mmol	~0.62	773 K	7

[a)] The temperature at which the corresponding *ZT* values are achieved.

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