Electronic Supplementary Material (ESI) for Sustainable Energy & Fuels.

Powerful drying and doping strategies for enhancing thermoelectric performance of tellurium nanostructures prepared via green hydrothermal synthesis

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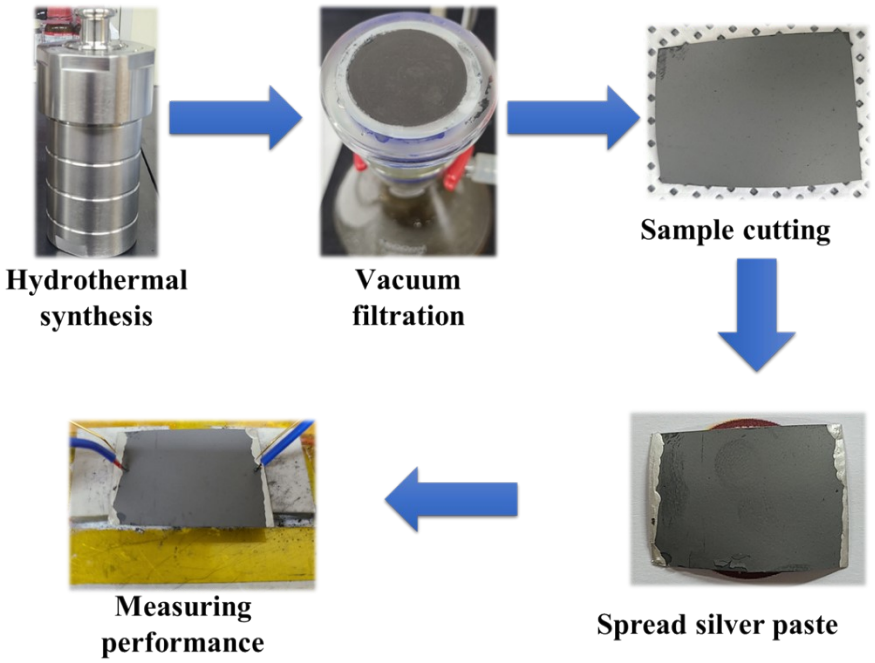


Figure S1. Digital images showing the preparation process of thermoelectric samples in this study.

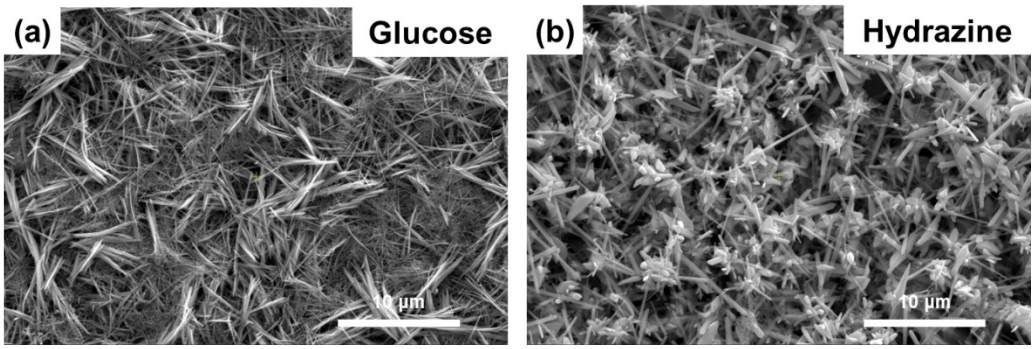
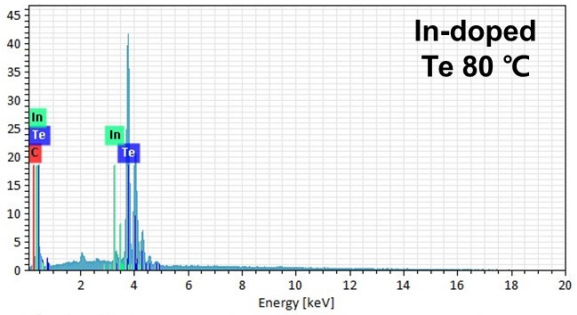
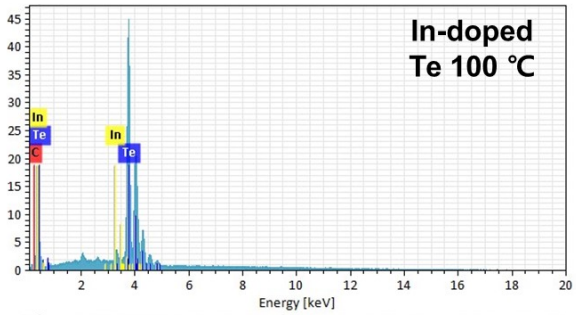


Figure S2. SEM images of Te nanostructures synthesized using (a) glucose and (b) hydrazine hydrate at a given synthesis condition.



Element	At. No.	Mass [%]	Mass Norm. [%]	Atom [%]	abs. error [%] (3 sigma)
Te	52	95.55	97.01	84.10	6.74
C	6	1.55	1.58	14.53	0.29
In	49	1.40	1.42	1.36	0.26
		98.50	**100.00**	**100.00**	



Element	At. No.	Mass [%]	Mass Norm. [%]	Atom [%]	abs. error [%] (3 sigma)
Te	52	94.52	96.85	83.24	6.75
C	6	1.64	1.68	15.35	0.30
In	49	1.44	1.47	1.41	0.27
		97.60	**100.00**	**100.00**	

Figure S3. DES data plots and Tables of In-doped Te samples from different synthesis temperatures (80 °C/100 °C).

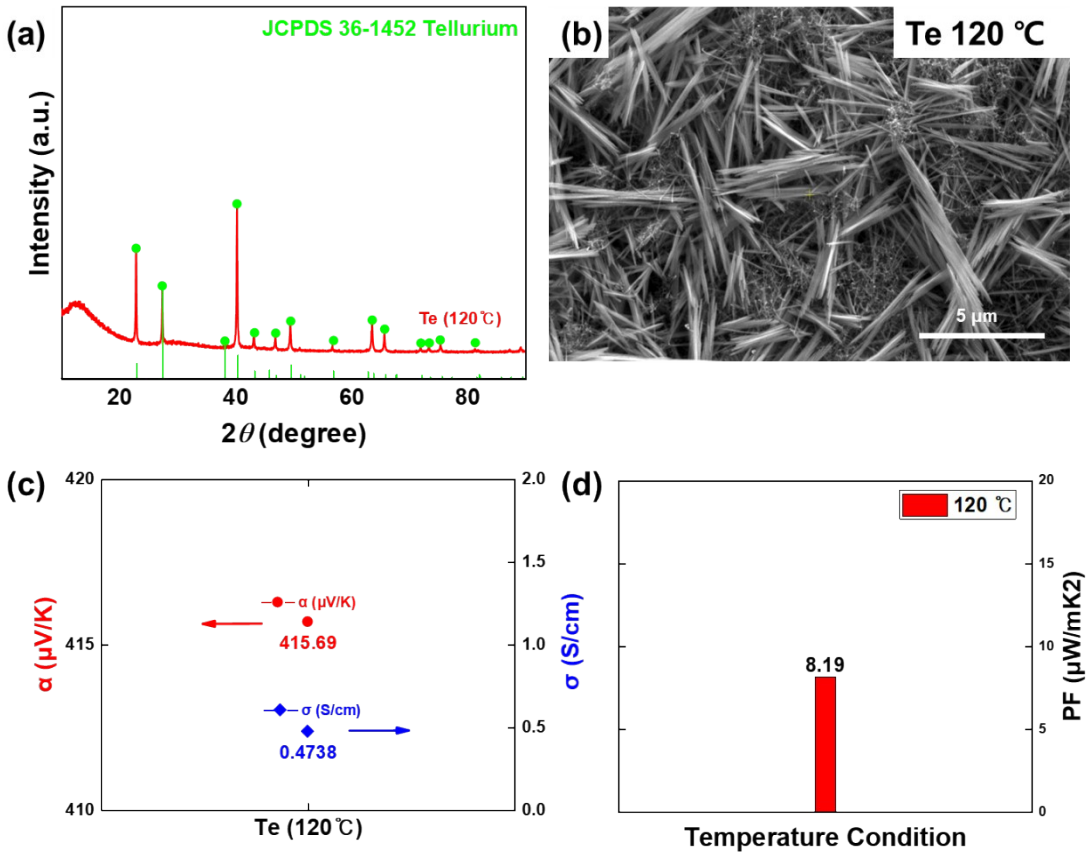


Figure S4. (a) XRD pattern spectra and (b) SEM images of Te nanostructures synthesized at 120 °C. Plots showing (c) α and σ and (d) power factor of Te nanostructure films synthesized at 120 °C.

Table S1. Hall effect measurement data for In-doped Te 100 ℃

Sample	n (10^{18} cm^{-3})	μ ($cm^2V^{-1}S^{-1}$)	σ (S/cm)	R_H (m^2/C)
In-doped Te 100 ℃	9.613	2.36	3.633	0.0186

*R_H: Hall coefficient

Hall coefficient measurement was analyzed using Van der Pauw method with a measurement system (Accent Optical Technologies HL5500PC). Compared to the results of the previous Hall effect analysis of Sn-doped Te sample through the hydrothermal synthesis process,[S1] charge carrier concentration (n) was slightly reduced but the mobility (μ) value was increased by 1.19 ($cm^2V^{-1}S^{-1}$), resulting in an improvement in σ of 2.832 (S/cm). In other words, the charge carrier conduction performance was improved by solution-state doping with In, from which it was confirmed that the In acted as a p-type dopant to improve the electrical conduction properties by increasing μ.

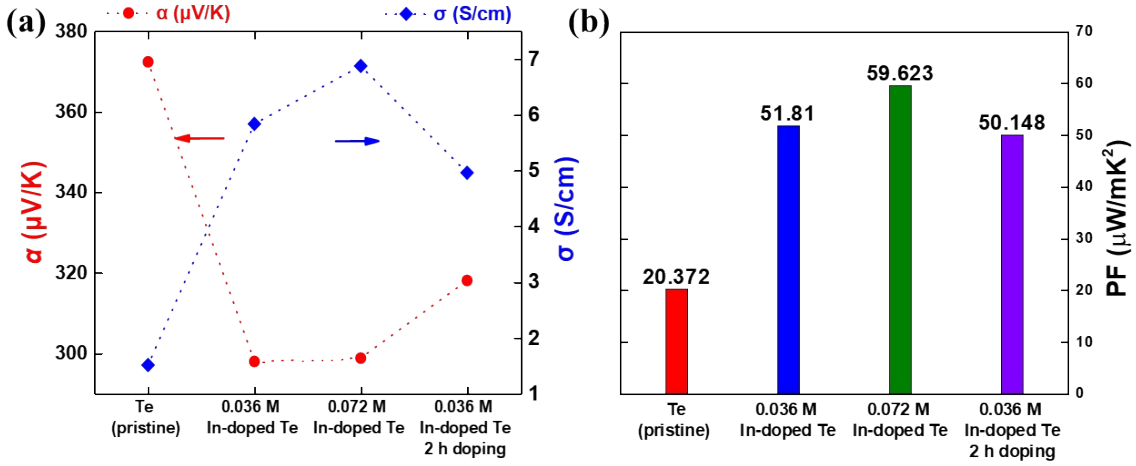


Figure S5. (a) α and σ and (b) *PF* of Te nanostructure films depending on the doping conditions.

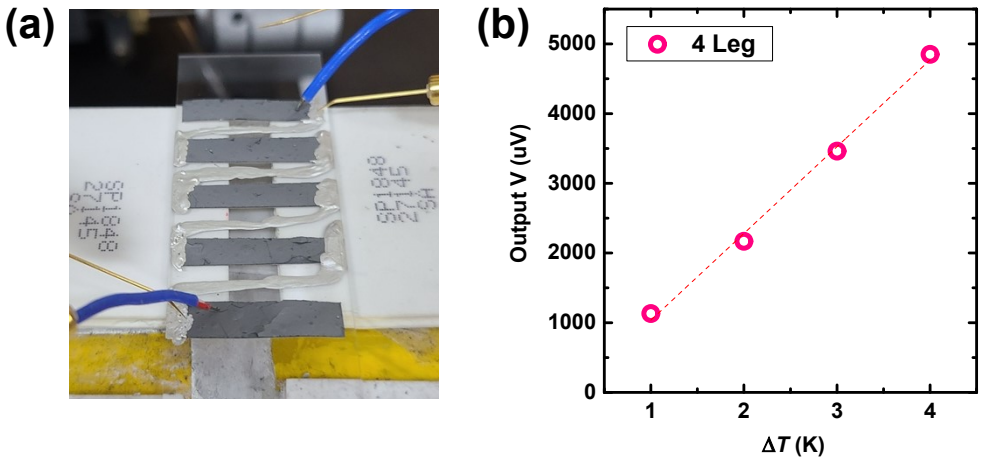


Figure S6. (a) Digital image of an as-assembled prototype TEG with the optimized Te nanostructure samples in this study. (b) The output voltage of the TEG depending on temperature difference.

Reference

S1. P. Sun, C. Li, J. Xu, Q. Jiang, W. Wang, J. Siu, F. Zhao, W. Ding, J. Hou, and F. Jiang, Sustainable Energy & Fuels, 2018, **2,** 2636-2643.