

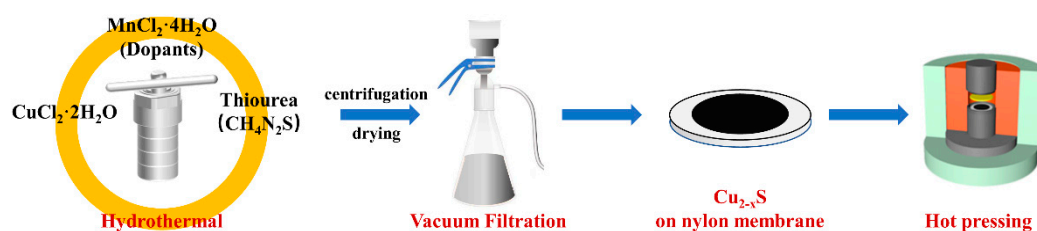
## Supplementary Material

### Largely enhanced thermoelectric power factor of flexible $\text{Cu}_{2-x}\text{S}$ film by doping Mn

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**Fig. S1.** Schematic diagram of the preparation process of the  $\text{Cu}_{2-x}\text{Mn}_y\text{S}$  film.

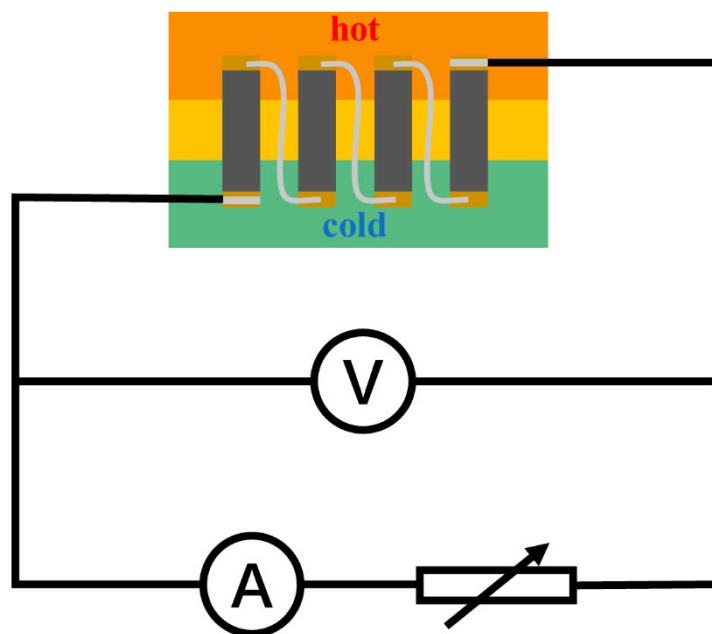


Fig. S2. A schematic diagram for the output performance measurement of the TE generator.

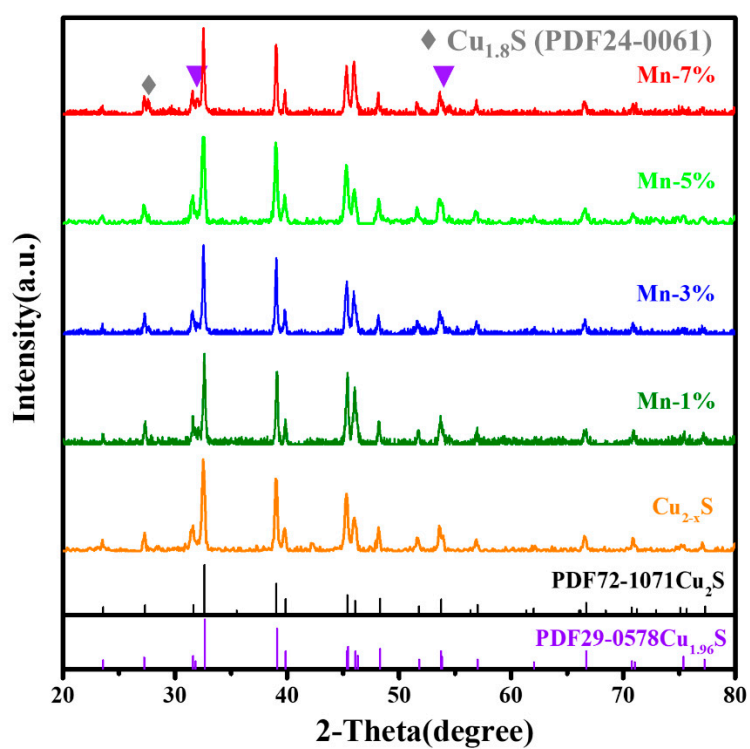
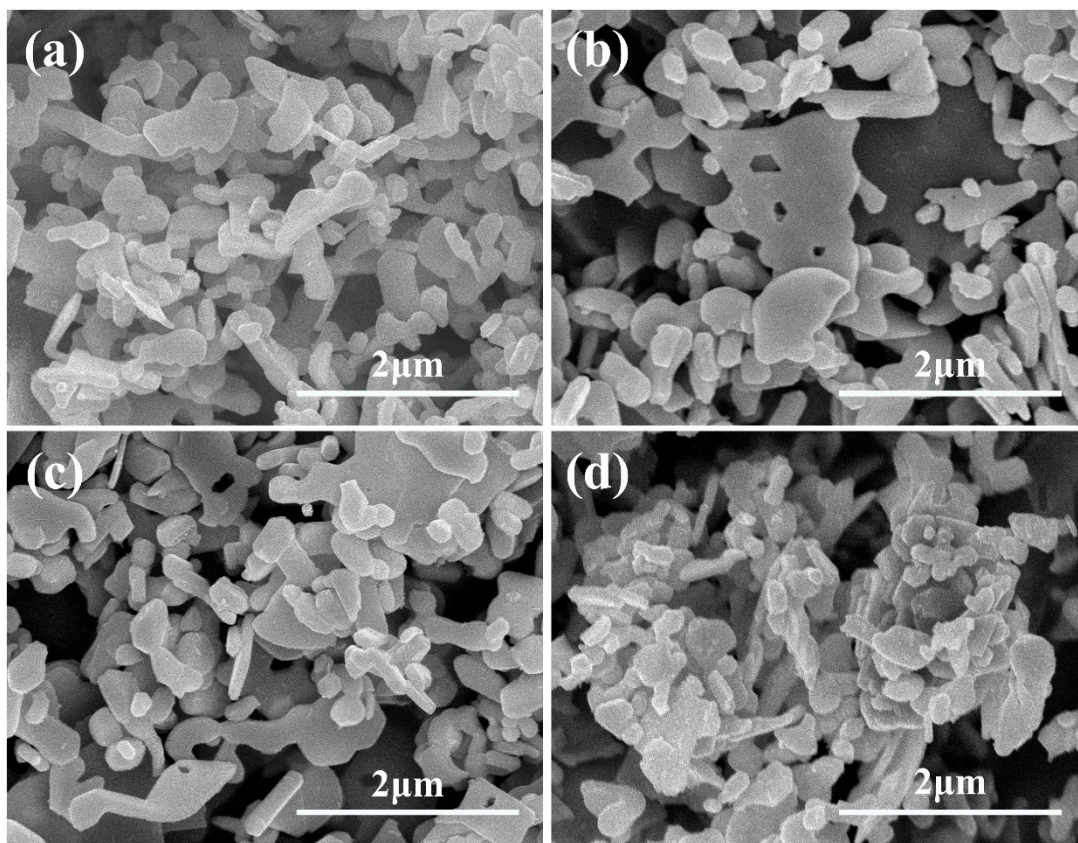
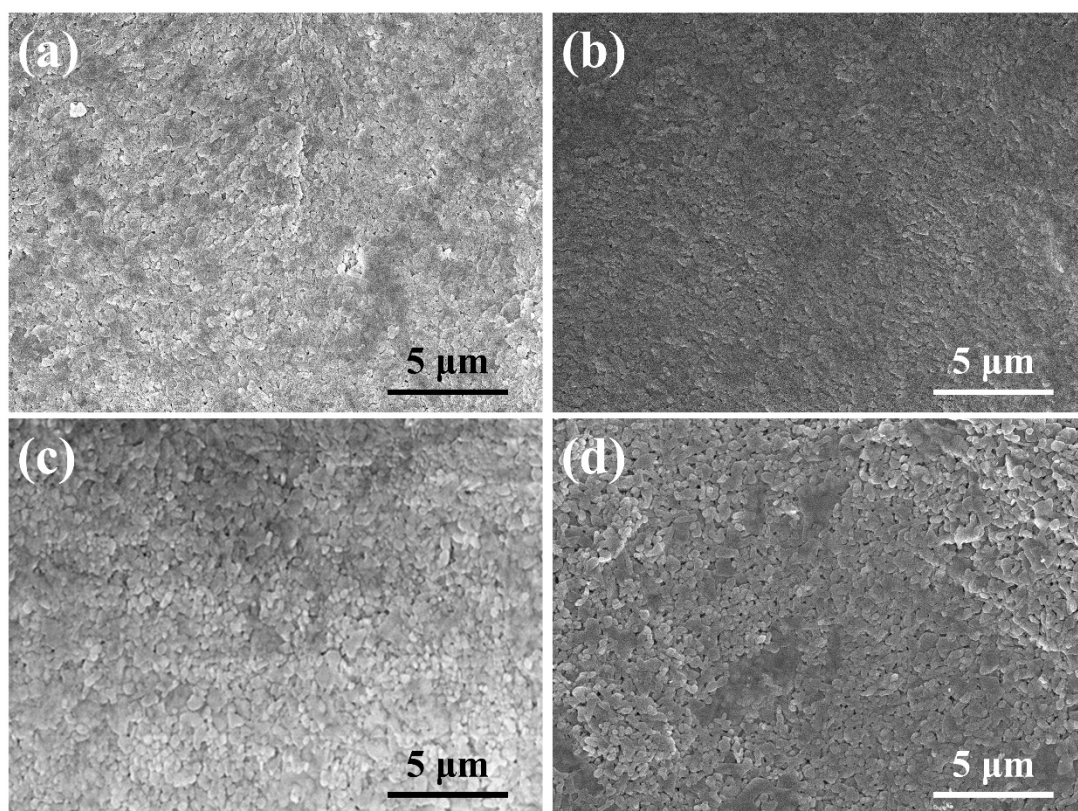


Fig. S3. XRD patterns of the  $\text{Cu}_{2-x}\text{Mn}_y\text{S}$  powders with varying doping content of Mn.

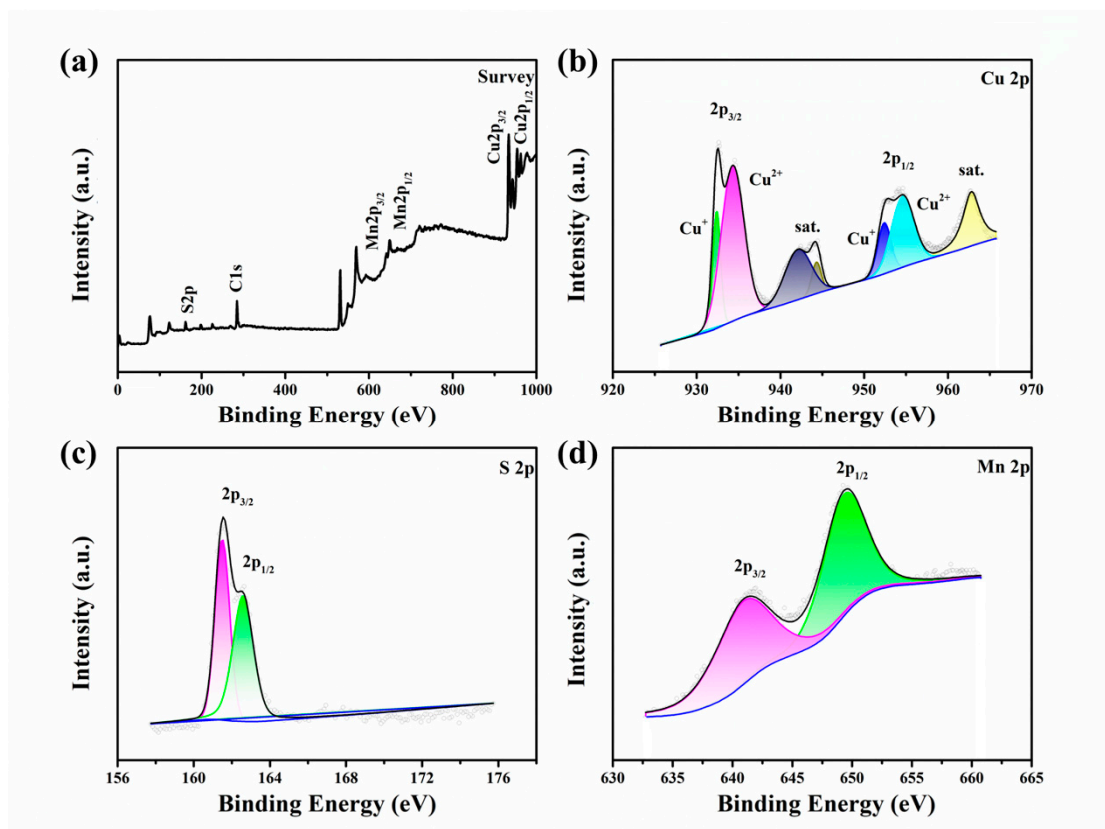


**Fig. S4.** SEM images of  $\text{Cu}_{2-x}\text{Mn}_y\text{S}$  powders. (a)  $y=0.01$ , (b)  $y=0.03$ , (c)  $y=0.05$ , (d)  $y=0.07$ .

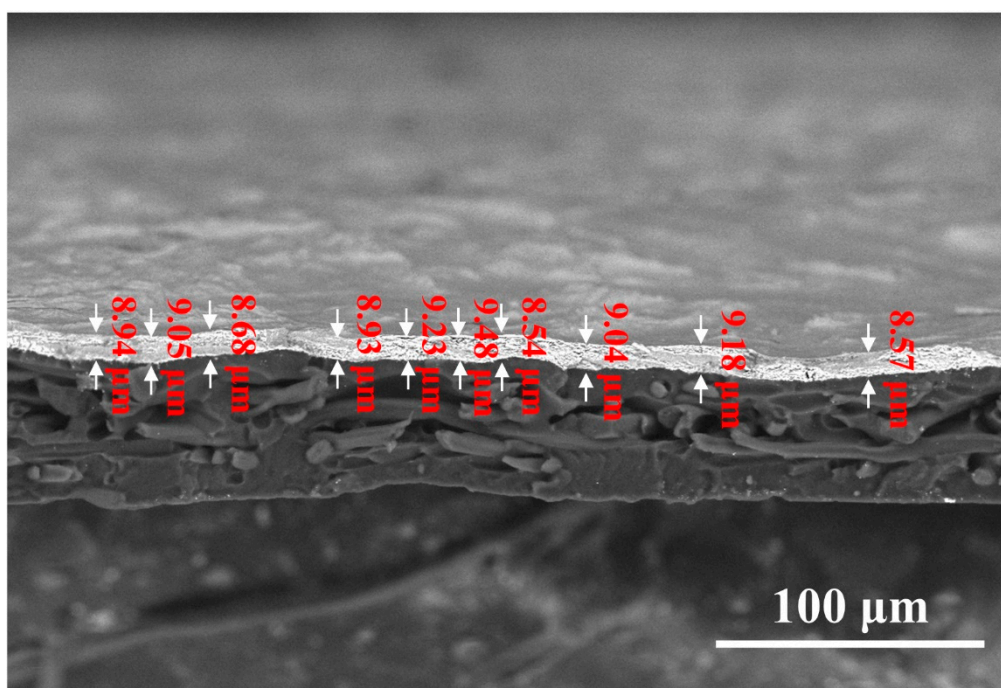




**Fig. S5.** SEM images of the  $\text{Cu}_{2-x}\text{Mn}_y\text{S}$  films. (a)  $y=0.01$ , (b)  $y=0.03$ , (c)  $y=0.05$ , (d)  $y=0.07$ .



**Fig. S6.** XPS spectra of the  $\text{Cu}_{2-x}\text{Mn}_{0.05}\text{S}$  powders. (a) survey scan. (b-d) high-resolution scans for Cu 2p, S 2p and Mn 2p, respectively.



**Fig. S7.** Cross-sectional SEM image of the  $\text{Cu}_{2-x}\text{Mn}_{0.05}\text{S}$  film.

**Table S1.** The measured and estimated values of the open-circuit voltage ( $V_{oc}$ ) and maximum output power ( $P_{max}$ ) of the f-TEG at different  $\Delta T$ .

$\Delta T$ (K)	$V_{oc}$ (mV)		$P_{max}$ (nW)	
	Measured values	Estimated values	Measured values	Estimated values
10.3	5.74	5.65	29.92	30.2
21.3	11.86	11.69	123.87	129.4
30.1	16.65	16.53	249.48	258.7