Electronic Supplementary Material (ESI) for Nanoscale.

Electronic Supplementary Information

Hydrogel-based printing strategy for high performance flexible thermoelectric generators

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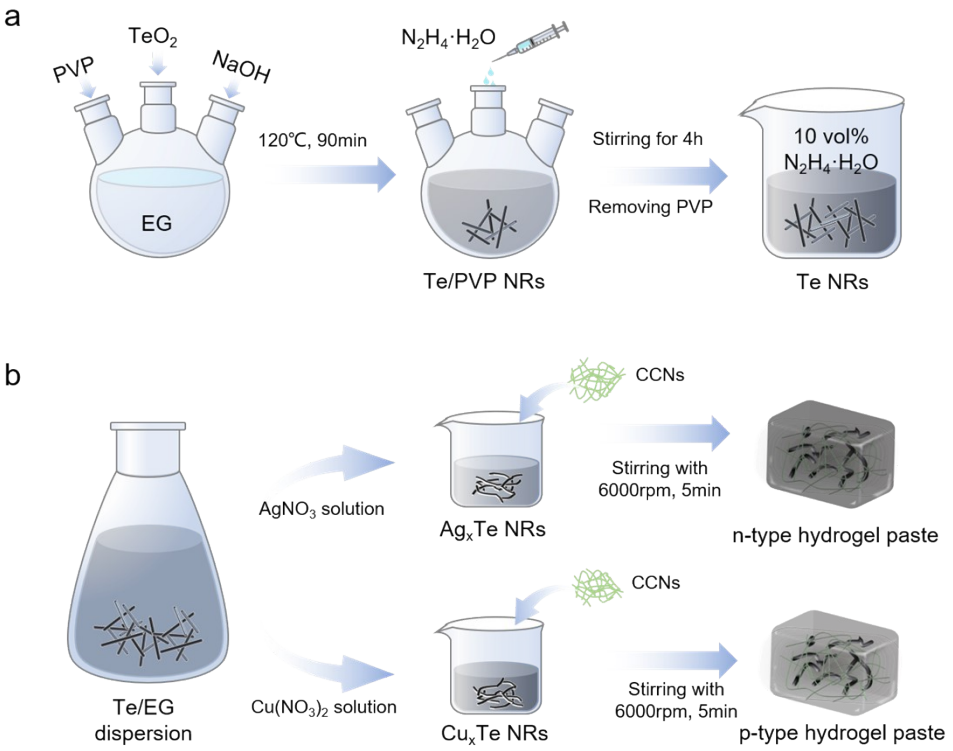

Fig. S1 (a) Schematic illustration showing the synthesis of Te NRs. (b) The preparation process of Ag_xTe and Cu_xTe NRs and the corresponding hydrogel pastes.

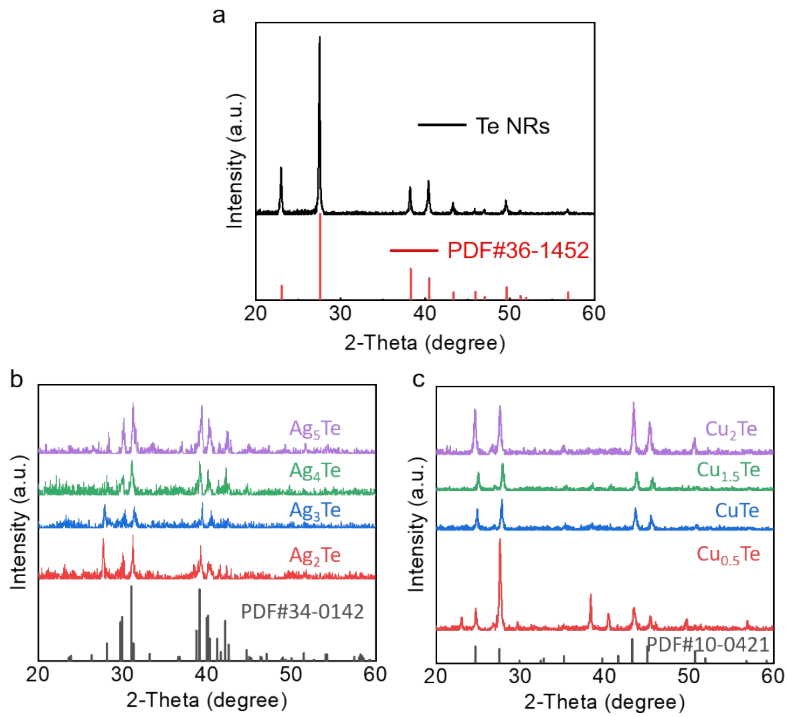

Fig. S2 XRD patterns of (a) Te NR, (b) Ag_xTe and (c) Cu_xTe with different nominal molar ratios. The nominal molar ratio was employed to define the subscripts in the chemical formulas, where the nominal molar ratio is the ratio of atoms in the initial reagent.

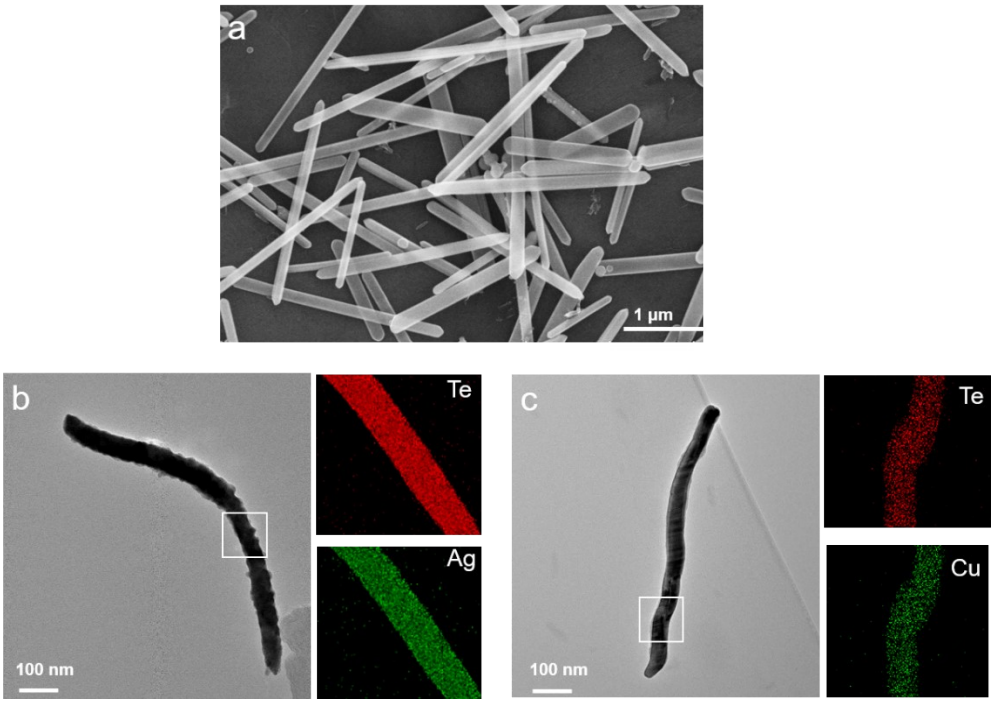

Fig. S3 (a) SEM image of Te NRs. The TEM and SAED images of (b) Ag_xTe and (c) Cu_xTe NRs

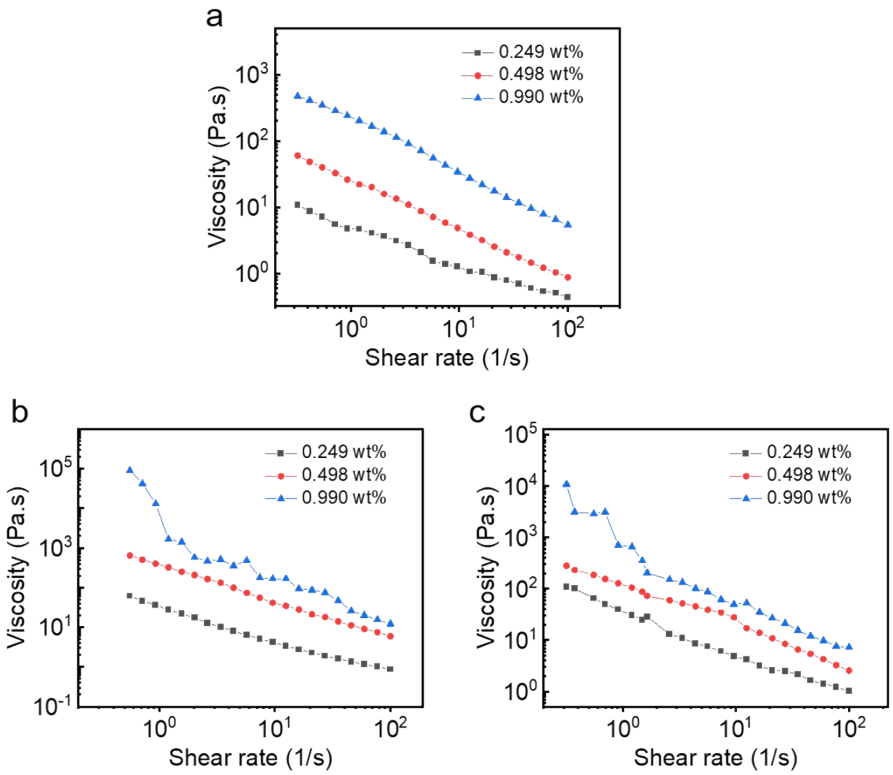

Fig. S4 (a) Viscosity of the CCN hydrogels as a function of shear rate. (b) Viscosity of the CCN/Ag_4Te pastes as a function of shear rate. (c) Viscosity of the CCN/$Cu_{1.5}Te$.pastes as a function of shear rate.

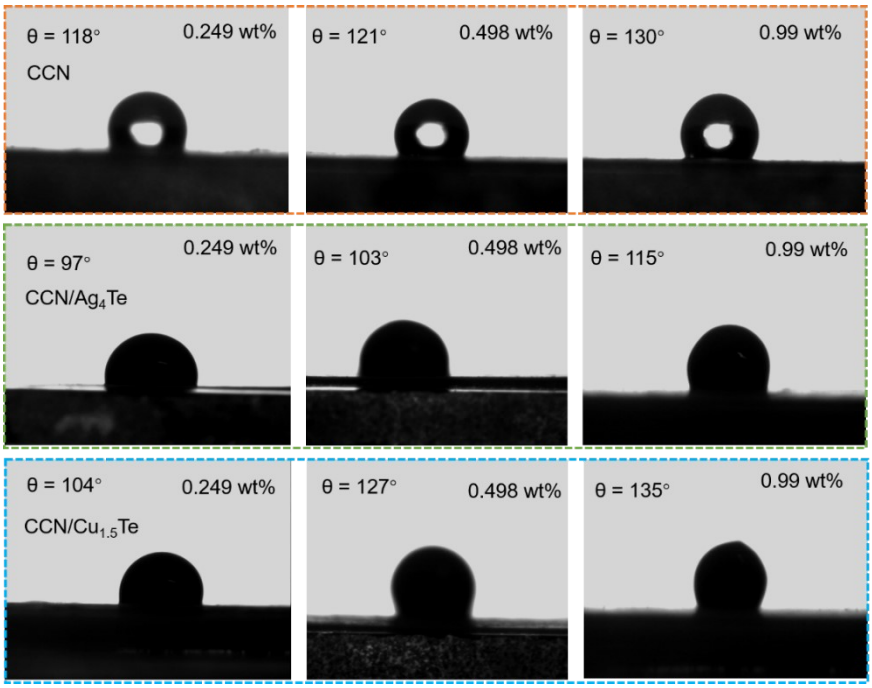

Fig. S5 Contact angels of the hydrogel pastes with different viscosity on cellulose paper.

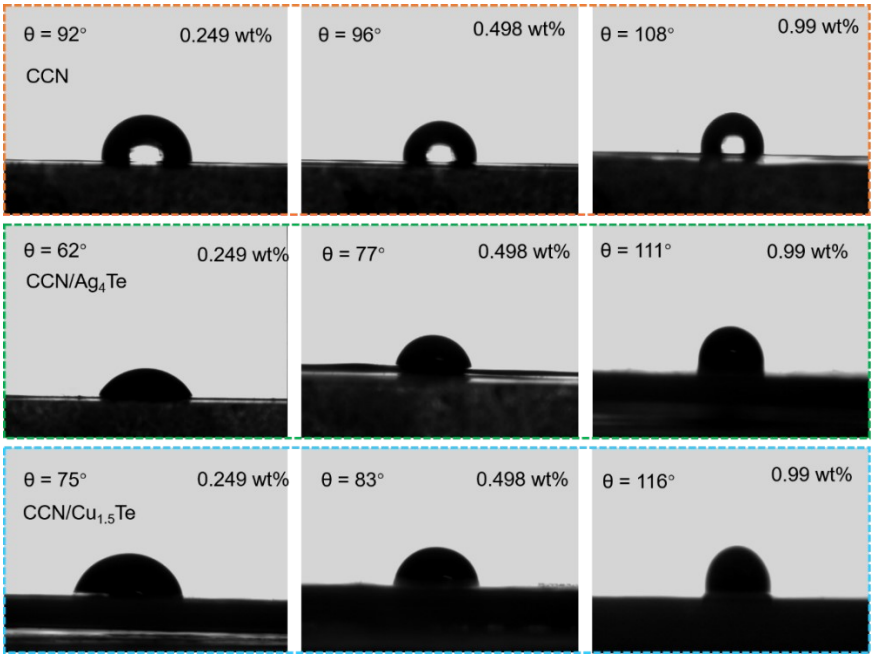

Fig. S6 Contact angels of the hydrogel pastes with different viscosity on PI substrate.

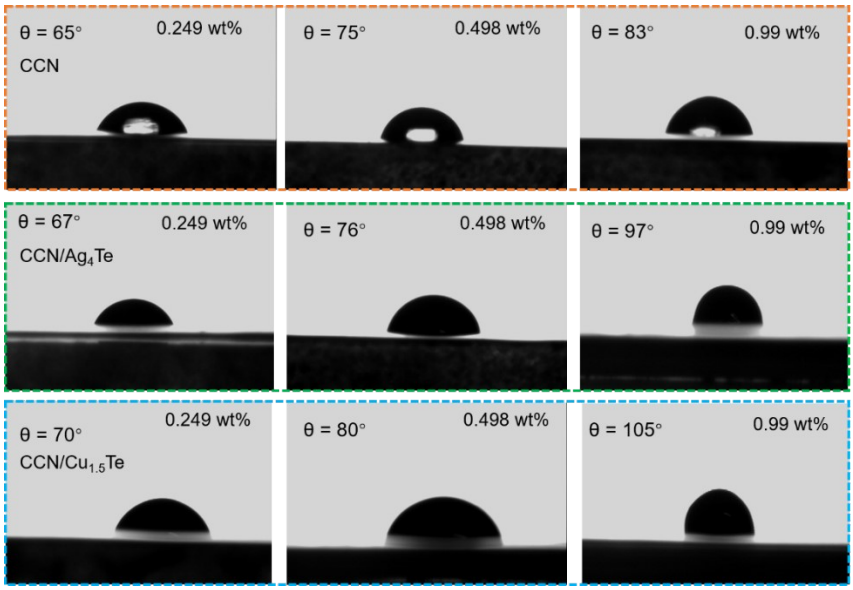

Fig.S7 Contact angels of the hydrogel pastes with different viscosity on PVDF substrate.

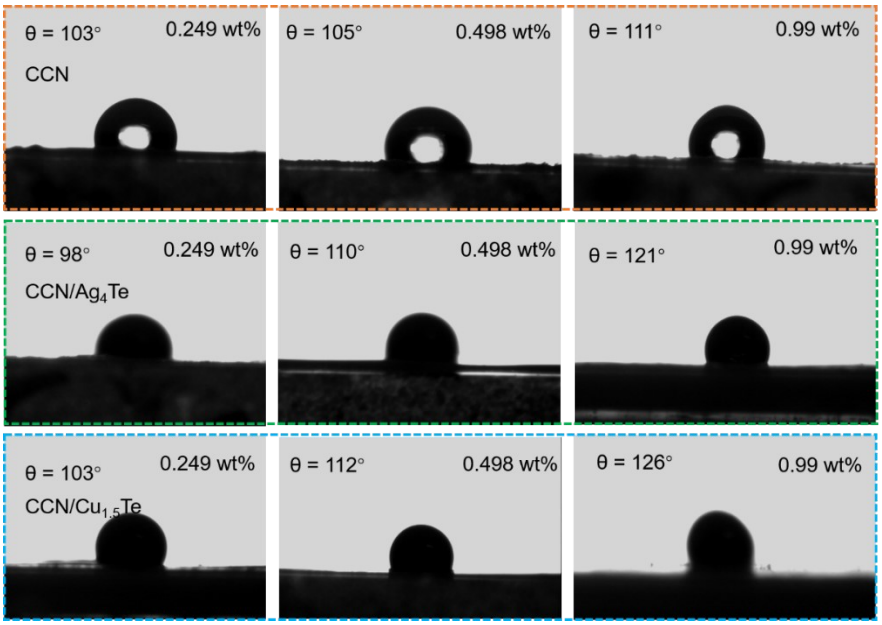

Fig.S8 Contact angels of the hydrogel pastes with different viscosity on PP substrate.

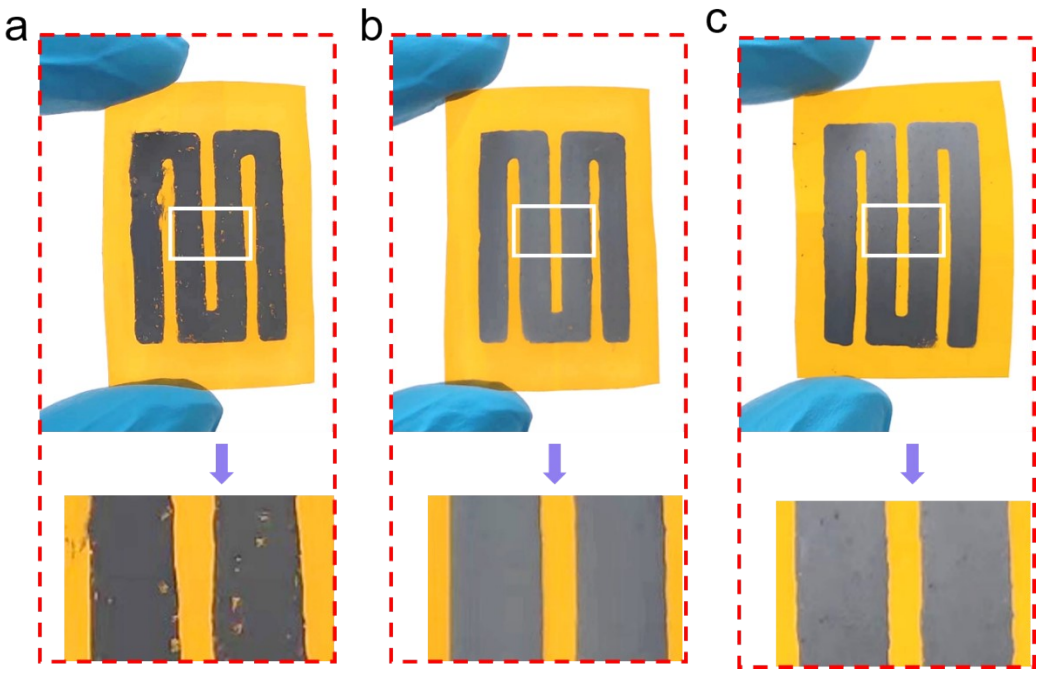

Fig. S9 Printed TE legs using the pastes with different CCN concentrations.

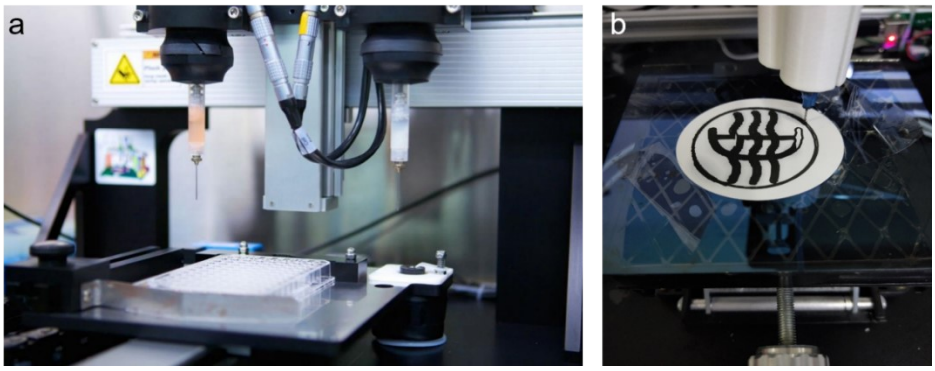

Fig. S10 The photos of bio-3D printer

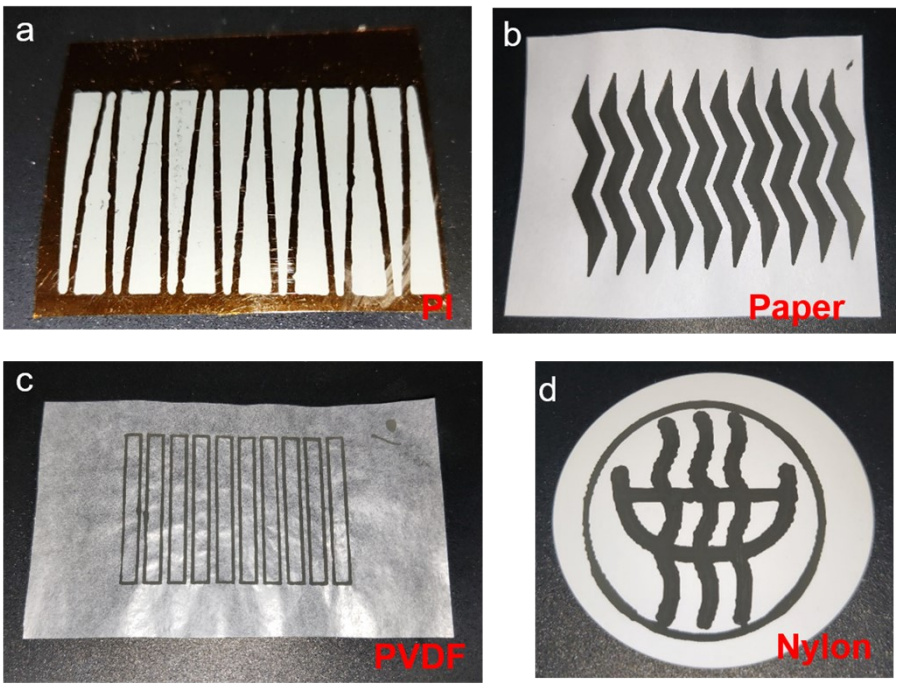

Fig. S11 TE patterns printed on different substrates

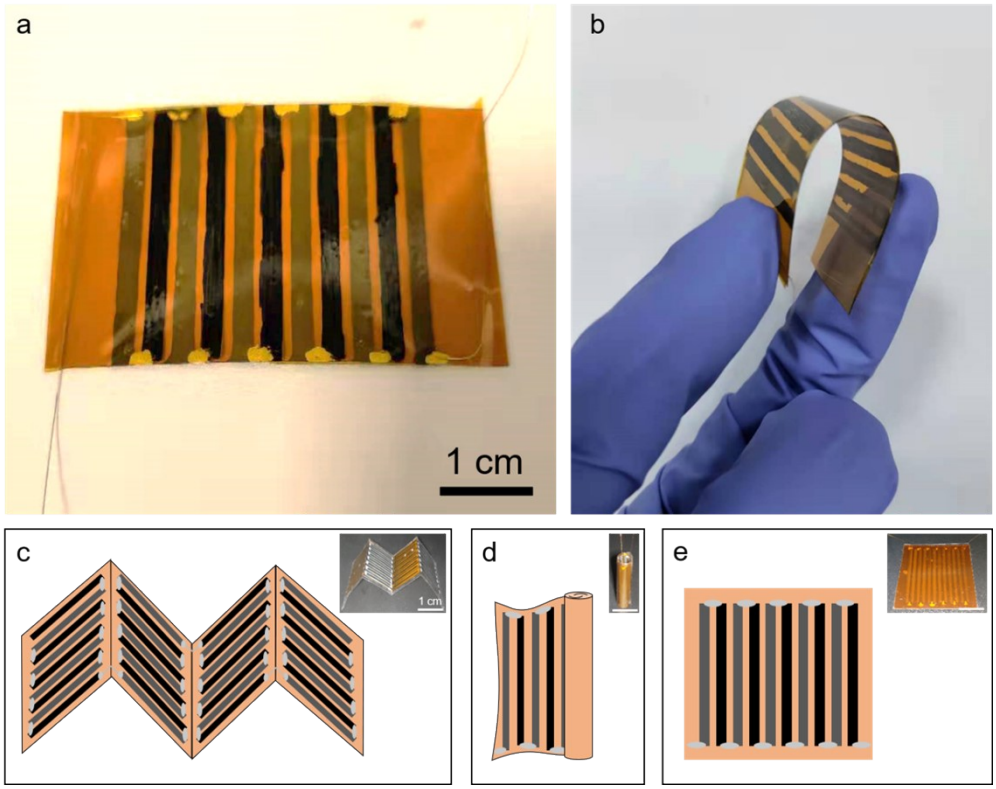

Fig. S12 (a, b) The photos of the printed f-TEG. (c) The structure and photo of the printed zigzag device. (d) The structure and photo of the reel device. (e) The structure and photo of the planar device.

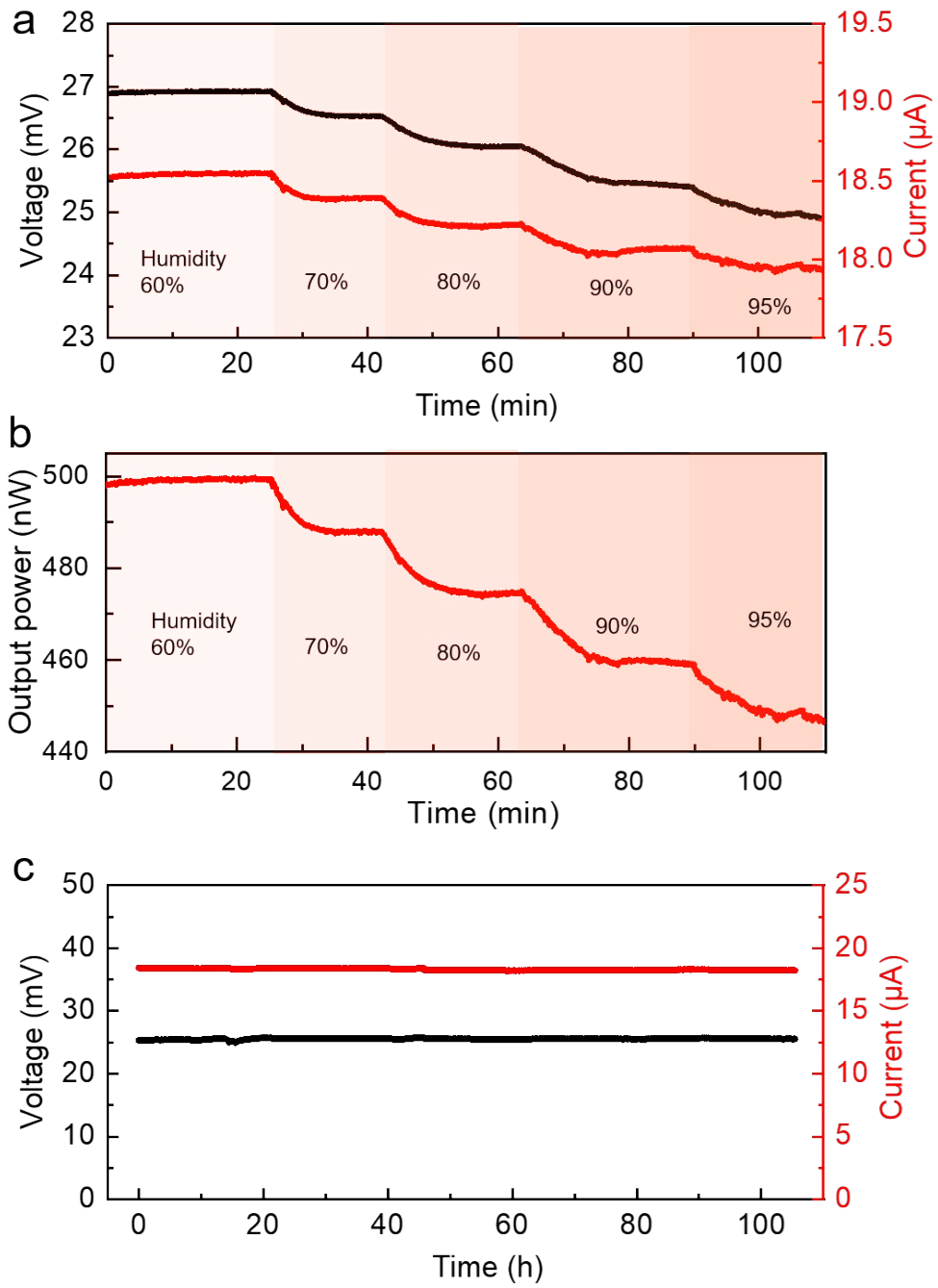

Fig. S13 (a) Output voltage and current of f-TEG as a function of humidity when the temperature difference is 50 K. (b) Output power of f-TEG as a function of humidity when the temperature difference is 50 K (c) Output voltage and current of f-TEG at a temperature gradient of 50 K during the continuous 110 h test.

Table S1. Resistance and TE output of flexible TEGs in previous reports

p-type material	n-type material	Organics	Ratio (wt%)	σ (S/cm)	ref
Sb_2Te_3	Bi_2Te_3	Epoxy resin	18-20	20-80	[1]
/	Bi_2Te_3	Epoxy resin	10-20	20-120	[2]
$Bi_{0.5}Sb_{1.5}Te_3$	Bi	epoxy	~8	~120/20	[3]
$Sb_{1.5}Bi_{0.5}Te_3$	$Bi_2Te_{2.7}Se_{0.3}$	dipropylene glycol monomethylether	50	20/60	[4]
$Bi_{0.5}Sb_{1.5}Te_3$	$Bi_2Se_{0.3}Te_{2.7}$	polystyrene	2	7.8/31.5	[5]
Sb_2Te_3	$Bi_{1.8}Te_{3.2}$	epoxy	~10	78/6.8	[6]
/	$Bi_2Te_{2.7}Se_{0.3}$	EG/Glycerol (annealing)	~35	11.6-169	[7]
$Cu_{1.5}Te$	Ag_4Te	**CCN**	**0.625**	**~734.6/145.1**	**This work**

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