Supplementary Information

Mechanical Energy Harvester Based on Cashmere Fibers

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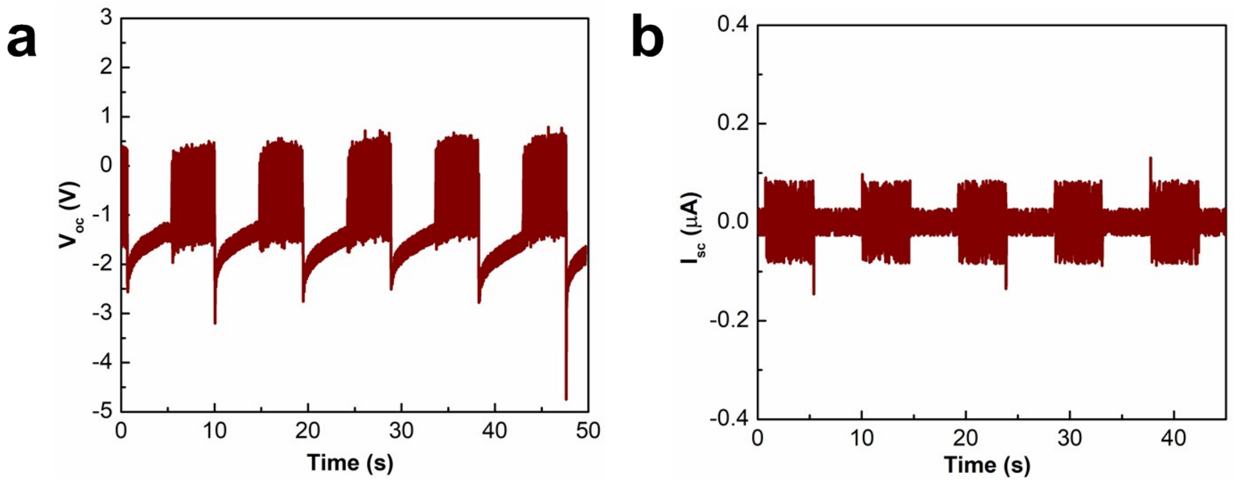

Figure S1. Alternating V_{oc} and I_{sc} signal of Pristine cashmere TENG.

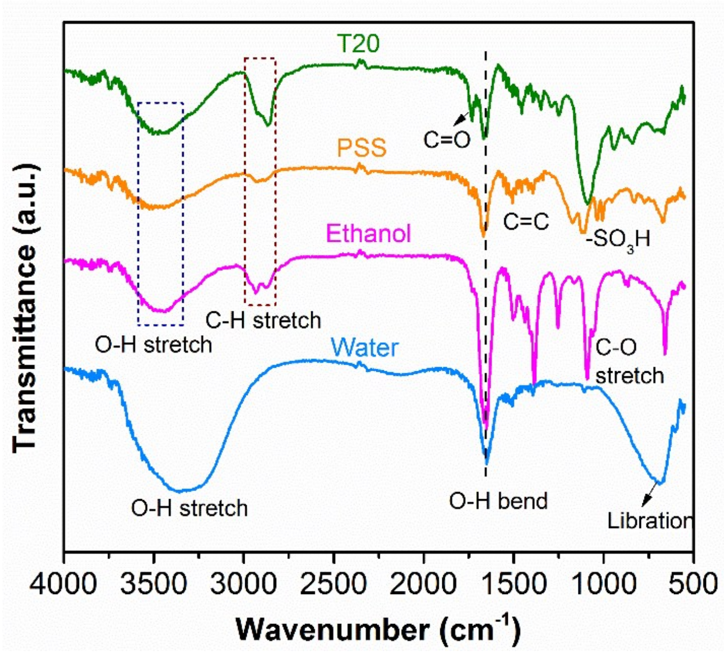

Figure S2. FT-IR spectra of cashmere after solvent treatment.

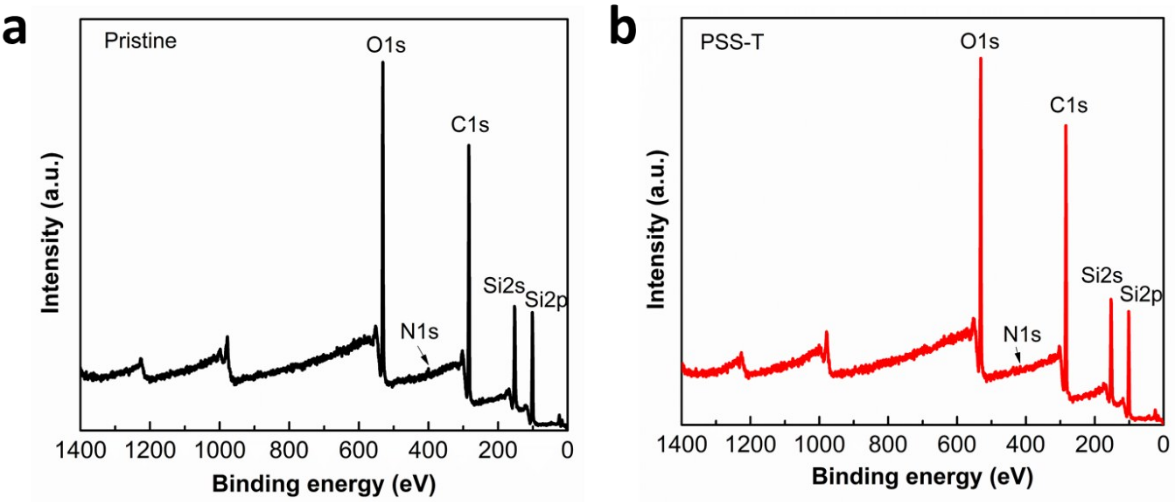

Figure S3. XPS full scan spectra of cashmere. (a) Pristine. (b) PSS-T. All three cashmere samples presented peaks of C, O and N, being the most predominant compositional elements of cashmere. While the peak of S was not detected which could be due to its relatively low content in the cashmere fiber. The ratio of C, O, and N for pristine cashmere is 67.2, 32.2 and 0.6, respectively, similar to that of PSS-T and T20-T cashmere. This verifies that PSS and T20 treatment has no impact on the fiber's elemental composition. Besides, the presence of Si element confirms the presence of silicone on fiber surface.

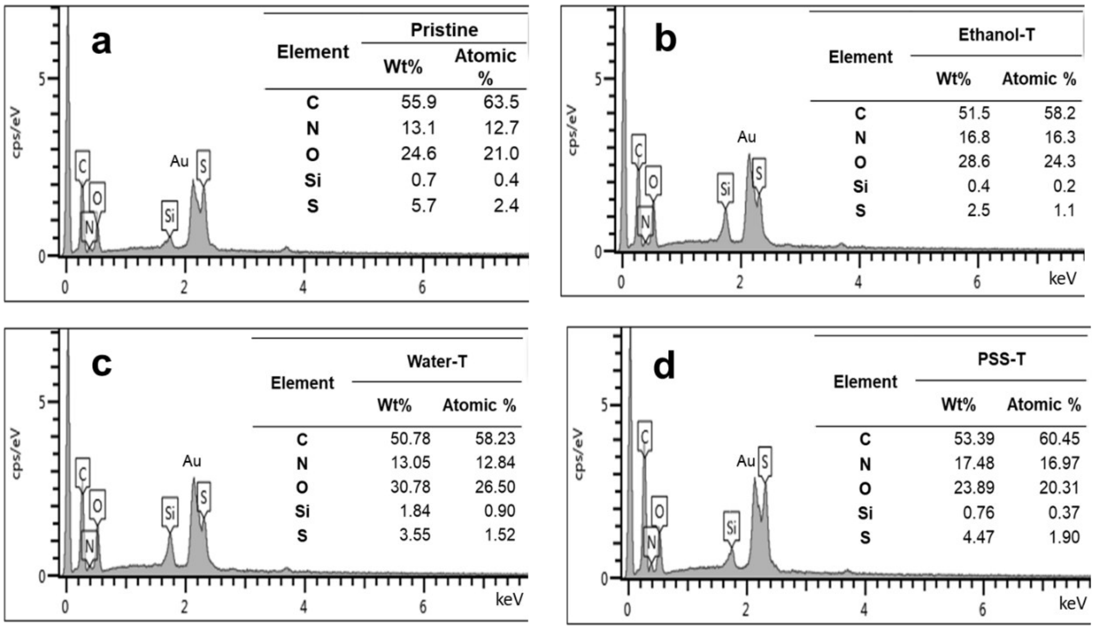

Figure S4. EDX spectra of cashmere fibers. (a) Pristine. (b) Ethanol-T. (c) Water-T. (d) PSS-T. Insets show the elemental compositions of the fibers after treatment.

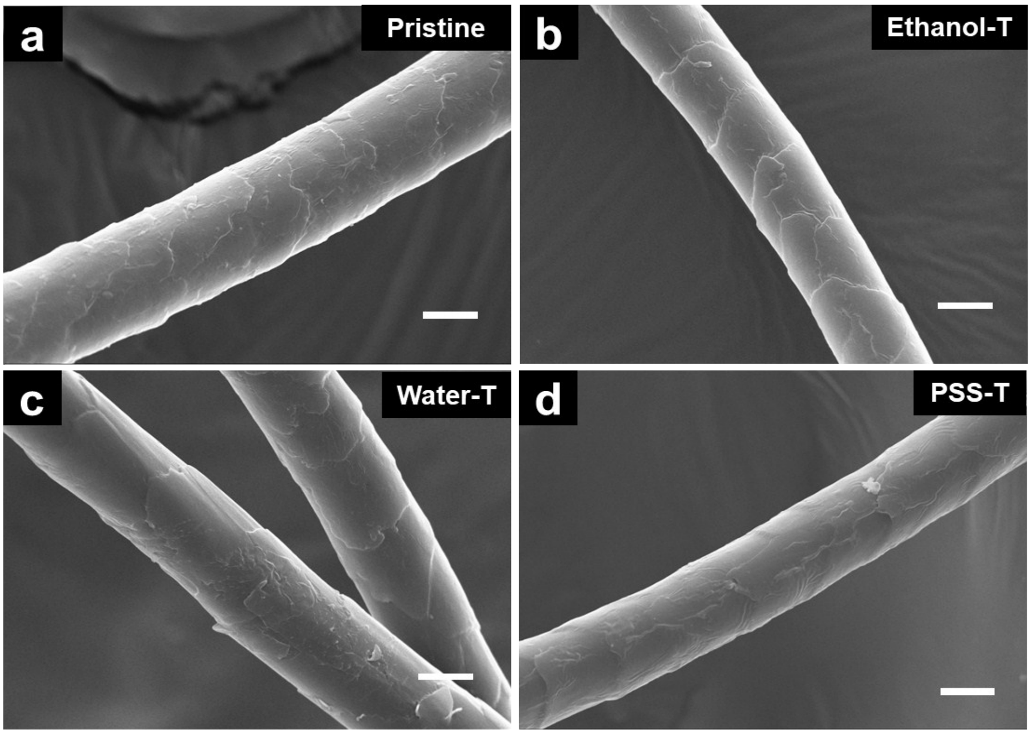

Figure S5. SEM images of cashmere fibers. (a) Pristine. (b) Ethanol-T. (c) Water-T. (d) PSS-T. (Scale bar: 10 μm)

Table S1. Mechanical property of cashmere fabric before and after solvent treatment

Sample	Tensile Strength (MPa)	ΔTensile Strength (%)
Pristine	7.65	-
Water-T	7.75	1.3
Ethanol-T	7.87	2.8
PSS-T	7.05	-7.8
T20-T	7.19	-6.0

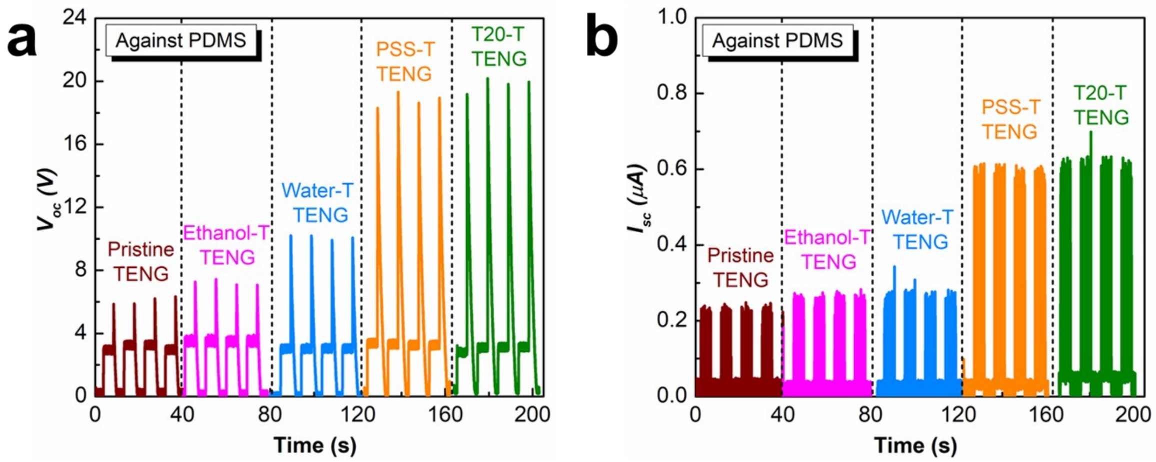

Figure S6. Output of cashmere TENG when employing PDMS (thickness 1 mm) as negative dielectric material. (a) V_{oc}. (b) I_{sc}.

Calculation of microstructure gap *x(t)* between cashmere and PTFE

According to the equation $V_{oc} = \frac{\sigma\, x(t)}{\varepsilon_0}$, where σ is surface charge density, ε_0 is permittivity of free space (8.85×10^{-14} F cm^{-1}). For T20-T TENG, σ_{max} is 16.8 μC m^{-2} and V_{oc} is 19.5 V, so $x(t)$, the calculated gap is ~10 μm.

Calculation of energy conversion efficiency of cashmere based TENG

i) Input energy (kinetic energy, work done on TENG by the motor)

$E_{kinetic} = \frac{1}{2}mv^2$ =0.74 mJ (m=1.48g, v is 1 m s^{-1})

ii) Output energy (electric energy, energy delivered to the external load resistance)

$E_{electric} = \int_{t_1}^{t_2} \frac{V^2}{R} dt$ = 0.282 μJ

iii) Energy conversion efficiency (η%)

$\eta\% = \frac{E_{electric}}{E_{kinetic}} =$ 3.8%