Supporting Information

Biodegradable Single-Electrode Triboelectric Nanogenerator for Self-Powered Robotic Texture Sensing

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Table T1: comparison table to showcase the output performance of the biodegradable polymer TENG with present study

Material	Operating Mode	Electrical Output	Application	Ref.
Silk fibroin, polyacrylamide, graphene oxide, and poly(3,4-ethylenedioxythiophene): poly(styrene sulfonate)	Single electrode mode	12 V 0.4μA	Pressure sensor for body movements	[1]
Fish gelatin (FG) film and poly(tetrafluoroethylene)/ poly (dimethyl siloxane) (PTFE/PDMS) composite film	Contact separation mode	130 V 0.35 μA	Real-time respiratory monitoring	[2]
PLA, PEDOT:PSS	Contact separation mode	0.92 μA	Energy Harvesting	[3]
Nitro-CNF, methyl-CNF	Contact separation mode	8 V, 9 μA	Energy Harvesting	[4]
PLA-PDMS	Contact separation mode	70 V 800 nA	Self-powered biosensor	[5]
PCL-MoS_2 / Nylon 66	Contact separation mode	127 V 1.22 μA	Self-powered traffic and Parking Management System	[6]
PCL/ starch solutions	Contact separation mode	50 V 1 μA	Powering of electronics	[7]
cellulose filter paper - $Ti_{0.8}O_2$ nanosheets	Contact separation mode	42 V 1 μA cm^{-2}	Powering of electronics	[8]
AgNWs/CNF paper		20 V 0.3 μA cm^{-2}	Powering of electronics	[9]
PCL/Al	Single electrode mode	118 V 772 nA	Self-powered texture recognition for tactile sensing	This work

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Table T2: summary table presenting the glass transition temperature (T_g), melting temperature (T_m), and crystallinity of the polymer samples studied.

Polymer	T_g (°C)	T_m (°C)	Crystallinity %
PLA	40.0	155.9	26.0
PCL	-	56.2	64.9
PTMC	27.7	164.6	3.4

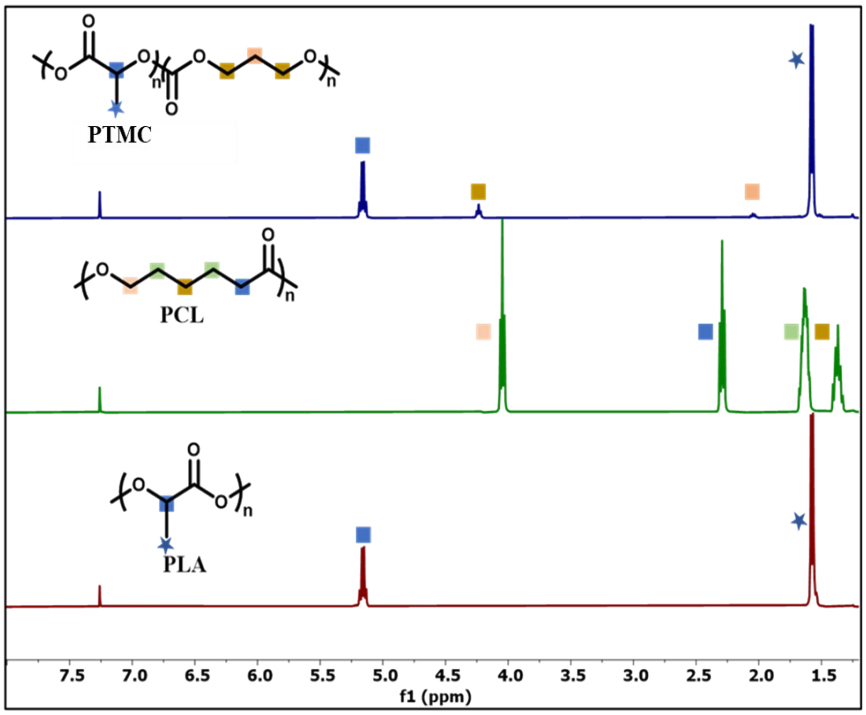

Figure S1: NMR spectra of PLA, PCL, and PTMC biodegradable polymers.

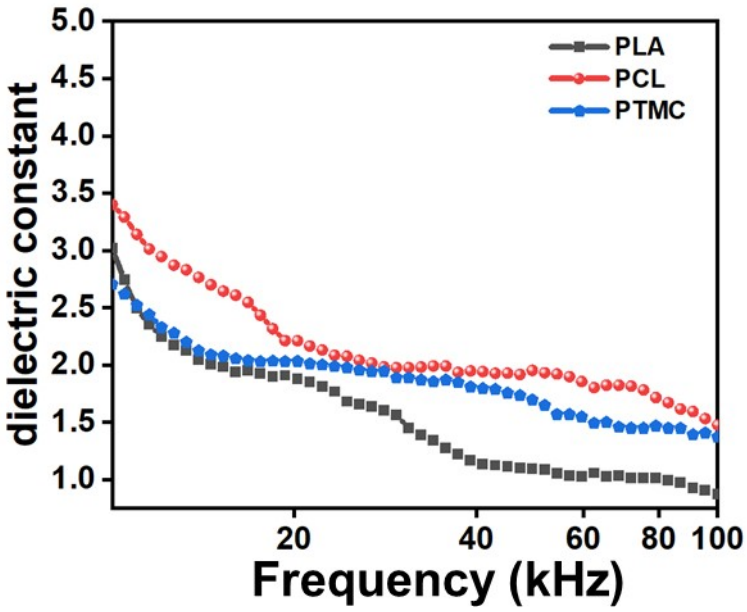

Figure S2: Dielectric constant of the PLA, PCL, and PTMC biodegradable polymers

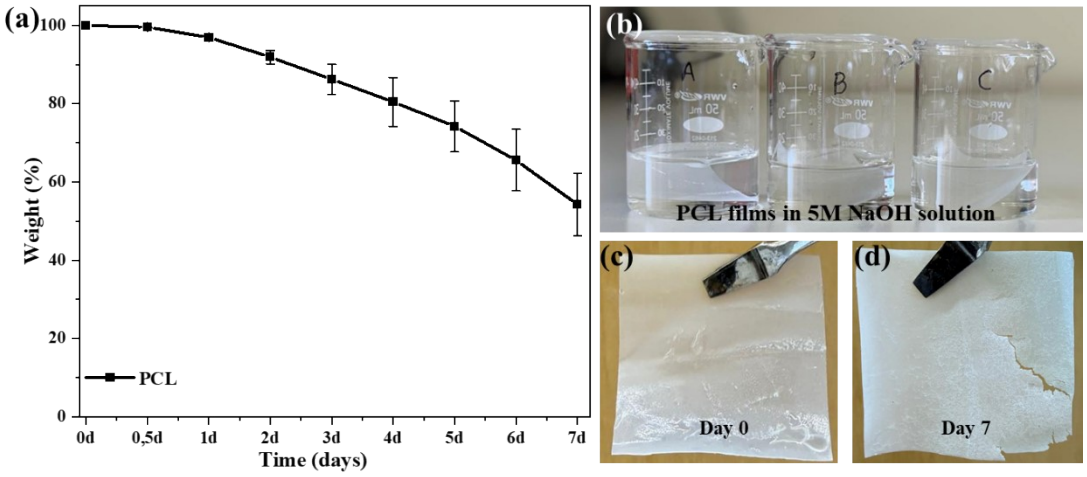

Figure S3: (a) degradation of the (3 × 3 cm^2) PCL film in 5M NaOH solution, (b) the photograph of the PCL film immersed in the 5M NaOH solution, (c) initial photograph of the PCL film, and (d) after 7 days

Accelerated Degradation study of PCL film in 5M NaOH solution

A 5 M NaOH solution was prepared. The PCL films were cut into 3 × 3 cm^2 pieces, and their initial weights were recorded. Each film was then immersed in 10 mL of the NaOH solution in a 50 mL beaker. At the same time intervals, the films were removed, thoroughly washed with deionized water, and gently wiped dry using tissue paper. The film weights were then measured. The percentage weight loss was calculated and plotted as a function of time:

Weight loss= ((Final weight)/(Initial weight)) × 100

After each measurement, the films were re-immersed in the NaOH solution. The NaOH solution was refreshed every two days throughout the experiment. The experiment was performed in triplicate.

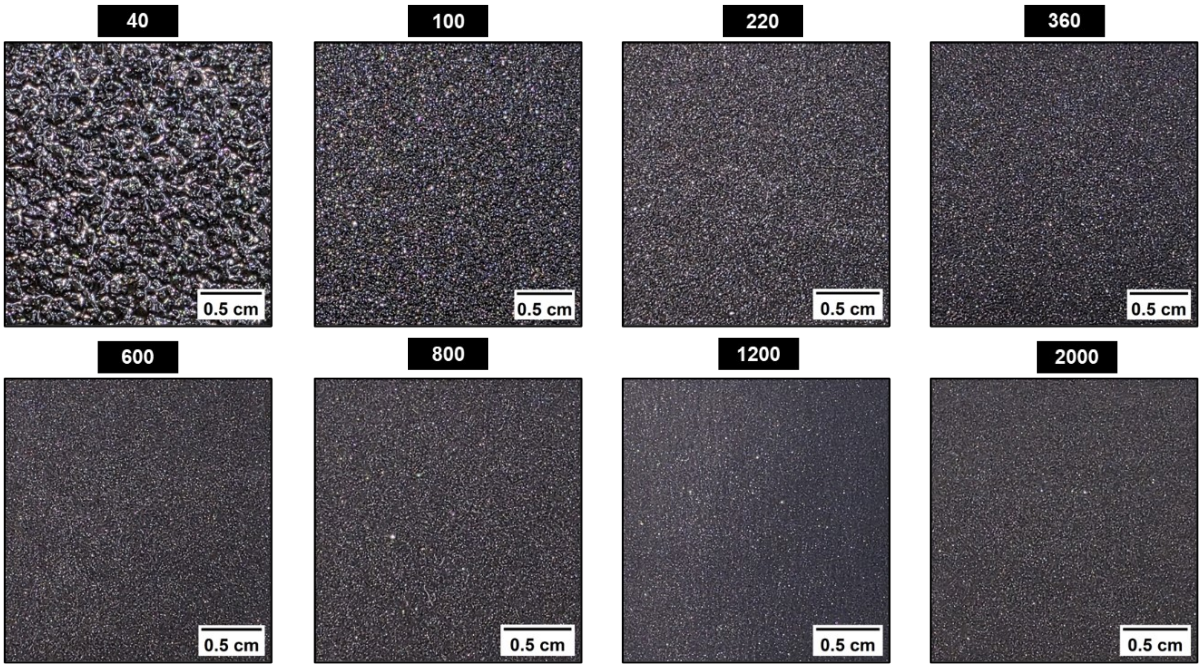

Figure S4: Optical image morphology of the various sandpapers.