Electronic Supplementary Information

ZnO-PTFE based antimicrobial, anti-reflective display coatings and high-sensitivity touch sensor

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Table S1. Sputtering conditions of ZnO–PTFE, neat ZnO, and neat PTFE thin films via conventional radio-frequency sputtering.

Sputtering details	**ZnO**	**ZnO-PTFE**	**PTFE**
Base pressure	2.5 x 10^{-5} mtorr	2.5 x 10^{-5} mtorr	2.5 x 10^{-5} mtorr
Power	ZnO: 60 W (RF)	ZnO: 60 W (RF) PTFE: 10, 25, 40, 60W (RF)	PTFE: 60 W (RF)
Working pressure	20 mtorr	20 mtorr	20 mtorr
Gas	Ar : 10 sccm	Ar : 10 sccm	Ar : 10 sccm
Target-Substrate	9 cm	9 cm	9cm
Deposition temperature	RT	RT	RT
Film thickness	30 nm	30nm	30nm

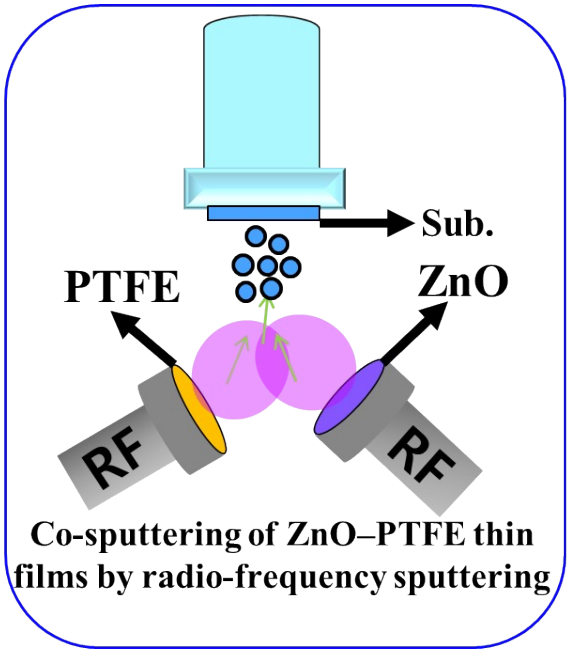

Fig. S1. Schematic illustration of sputtering process of ZnO–PTFE composite thin films by conventional co-sputtering method using RF sputtering.

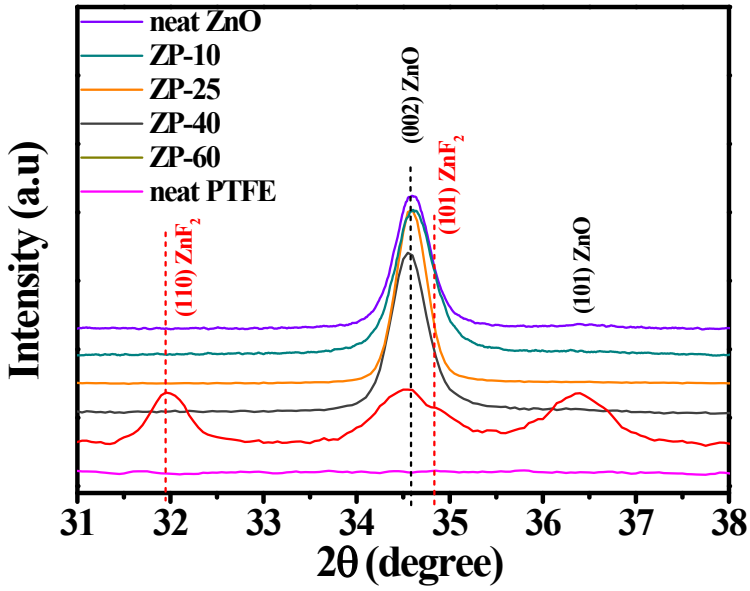

Fig. S2. The enlarged XRD pattern of ZnO–PTFE composite thin films.

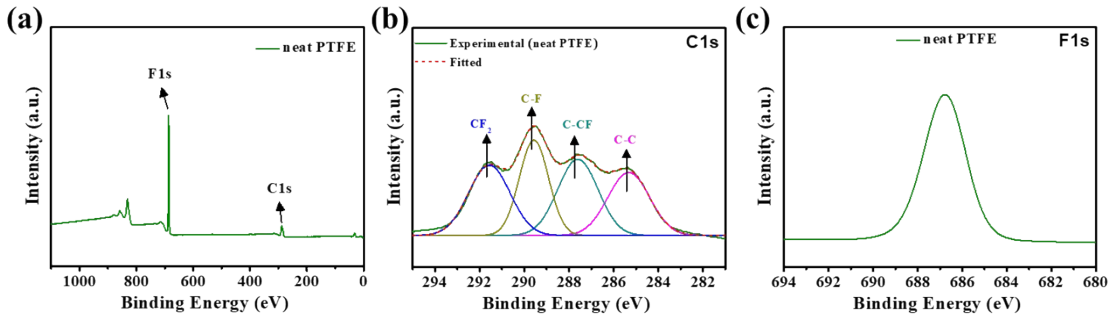

Fig. S3. The XPS analysis of neat PTFE thin films; a) full scan, b) core-level spectrum of carbon, and c) core-level spectrum of fluorine.

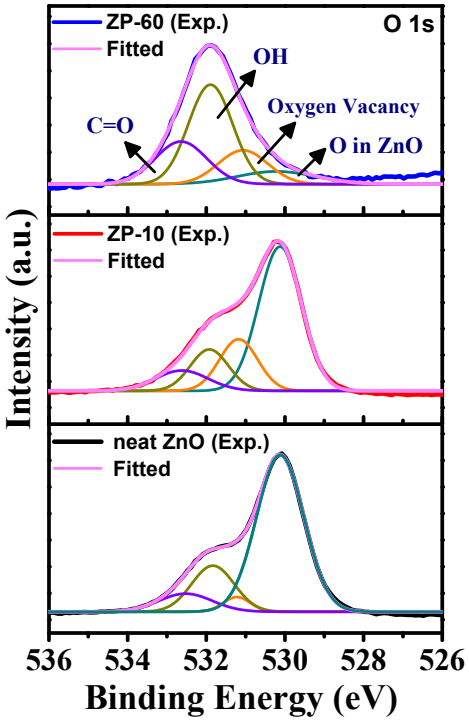

Fig. S4. The XPS core-level spectrum of oxygen in ZnO–PTFE films along with neat ZnO film.

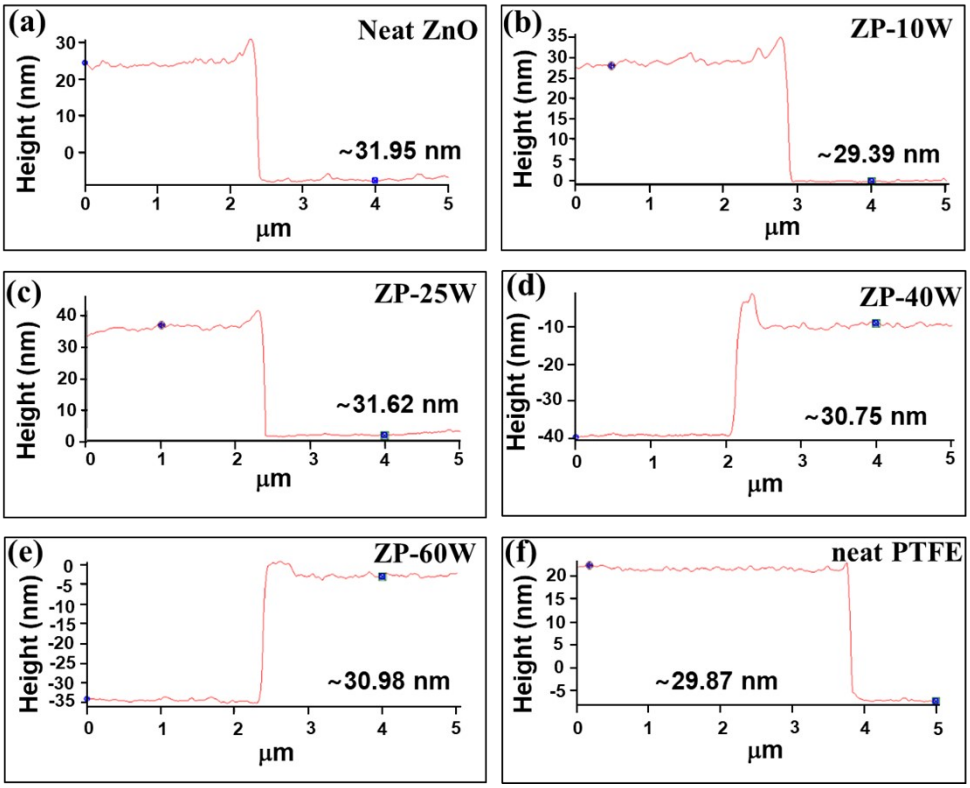

Fig. S5. The height profile images of ZnO–PTFE films with different PTFE target powers along with neat ZnO, and neat PTFE films having thickness of 30 nm.

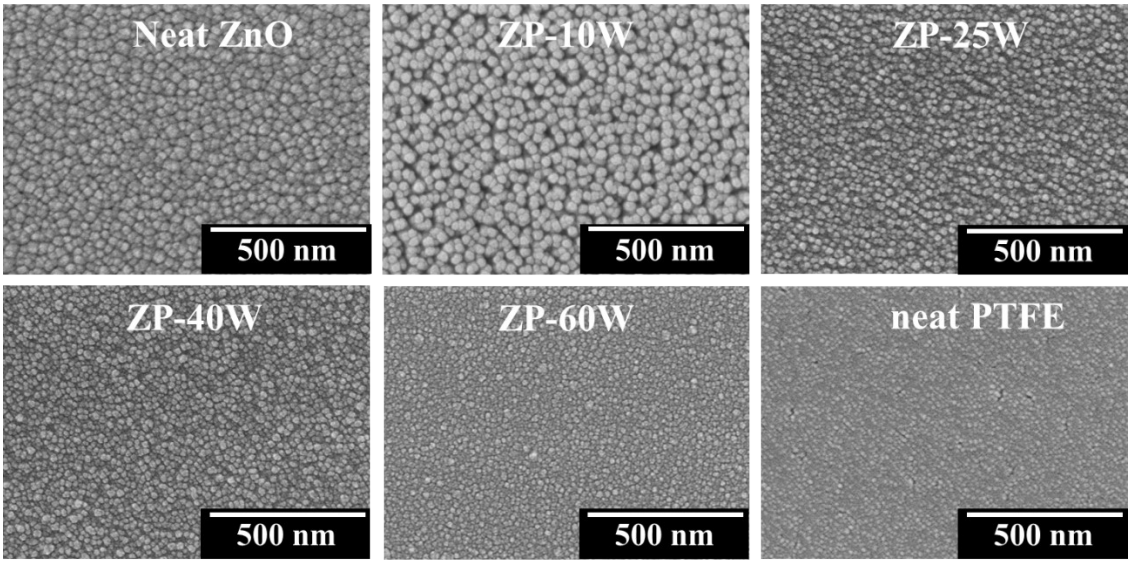

Fig. S6. The SEM surface images of of ZnO–PTFE films with different PTFE target powers along with neat ZnO, and neat PTFE films.

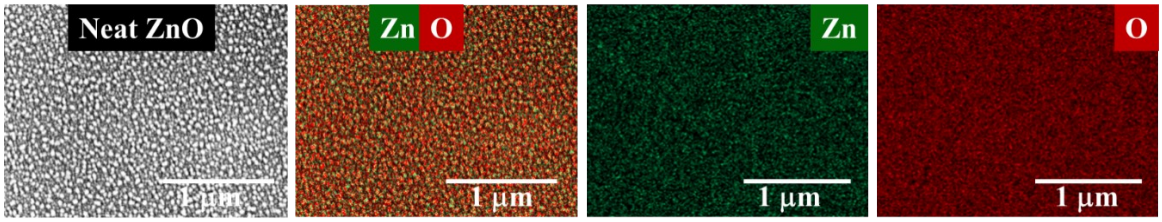

Fig. S7. The SEM-EDS elemental mapping images of neat ZnO thin films deposited on glass substrate.

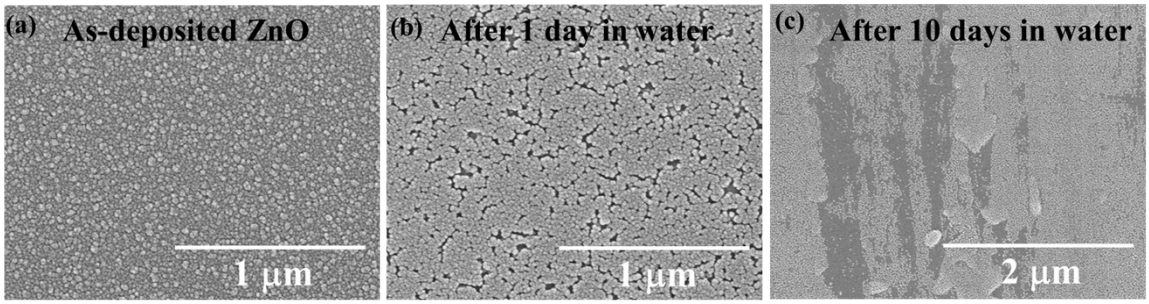

Fig. S8. The SEM images of ZnO films in case of a) before water dipping, b) after 1 day, and c) after 10 days water dipping.

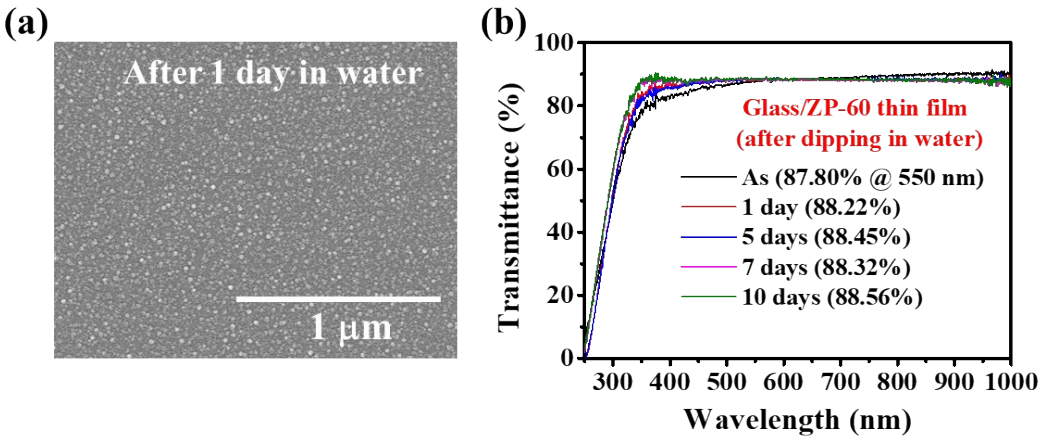

Fig. S9. a) The SEM image of ZP-60 film after dipping in water for 1 day, and c) the UV-transmittance plot of the same ZP-60 film after dipping in water for a period of 10 days.

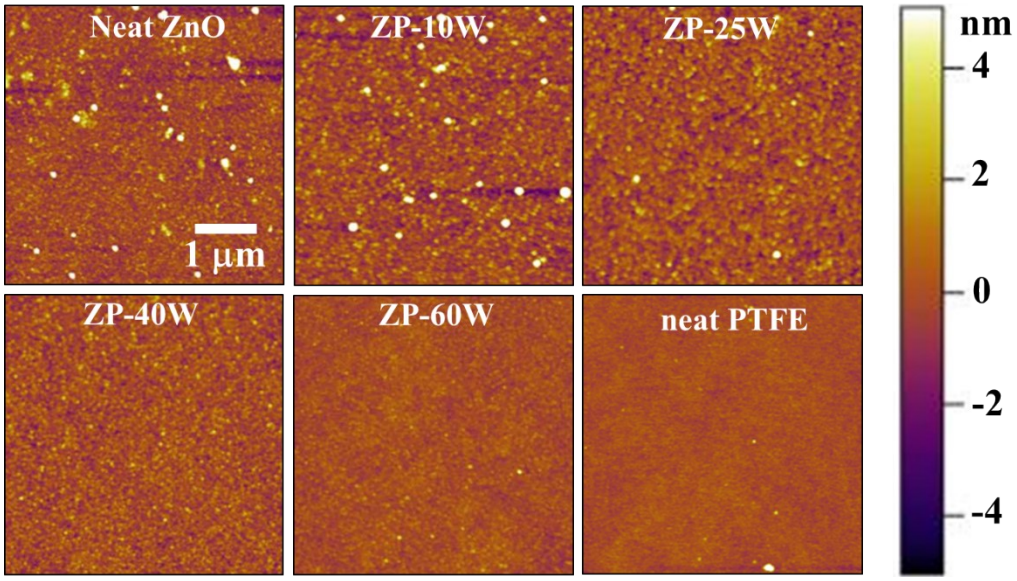

Fig. S10. The AFM images of ZnO–PTFE films with different PTFE target powers along with neat ZnO, and neat PTFE films.

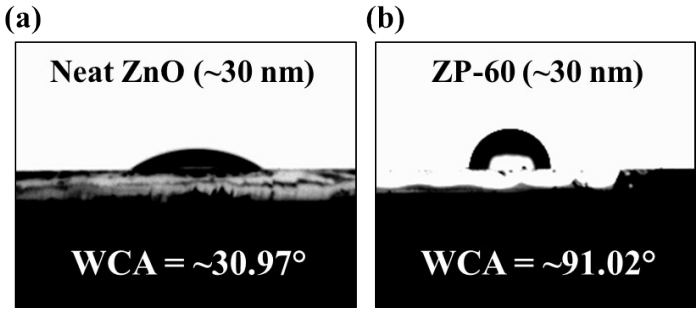

Fig. S11. The photographic images of water contact angles of 30 nm thick a) neat ZnO and, b) ZP-60 films.

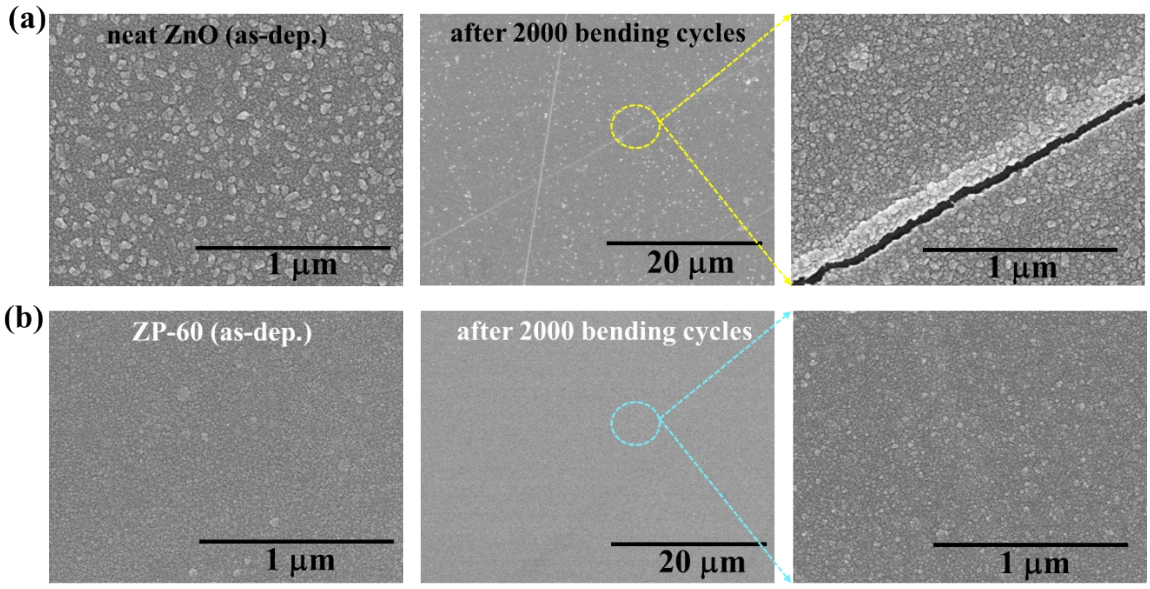

Fig. S12. The SEM images of neat ZnO and ZP-60 films before and after bending cycles of 2000 under hand bending with the radius of around 5 mm.

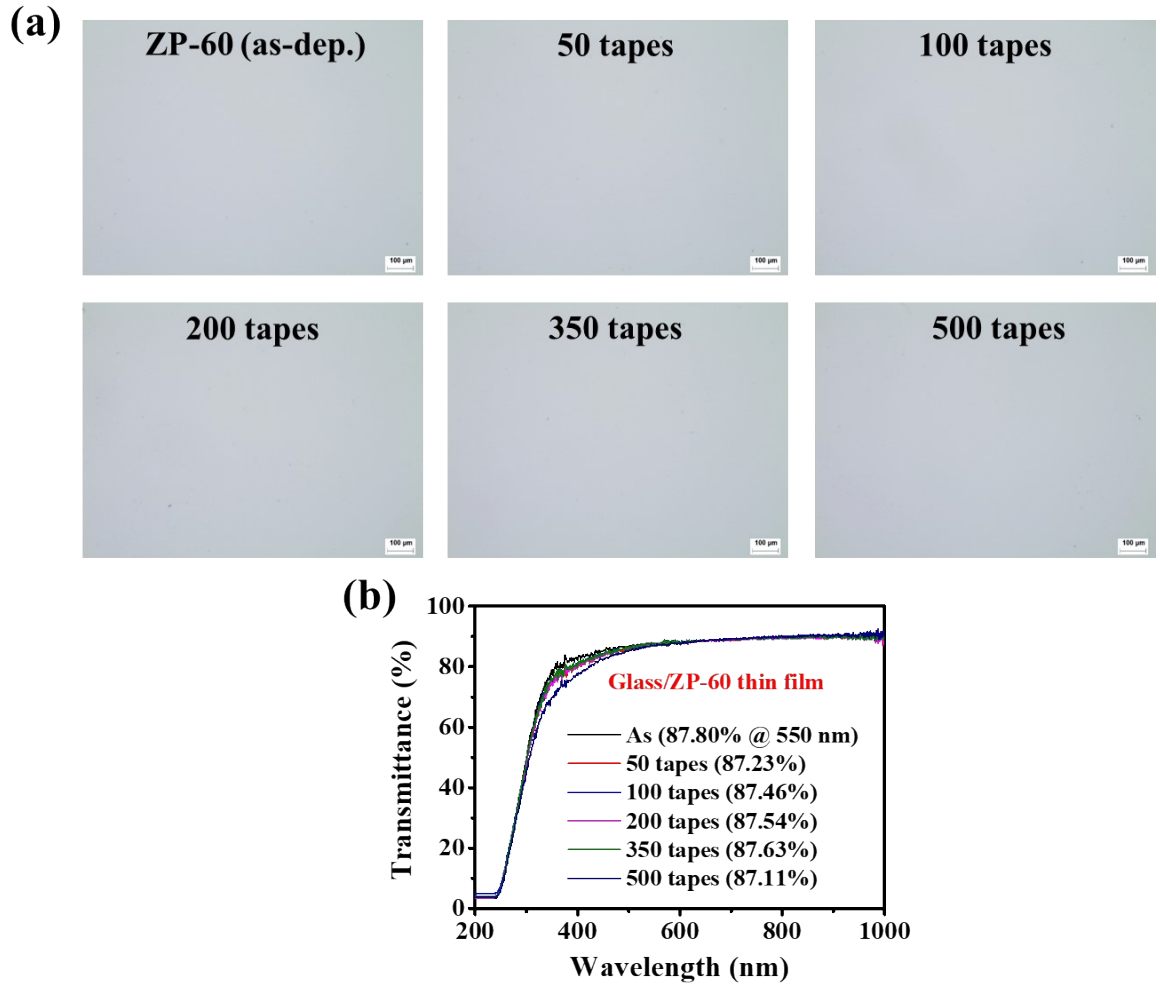

Fig. S13. a) The SEM images of ZP-60 films under abrasive tape test using poly imide tape, b) corresponding UV-transmittance plot.

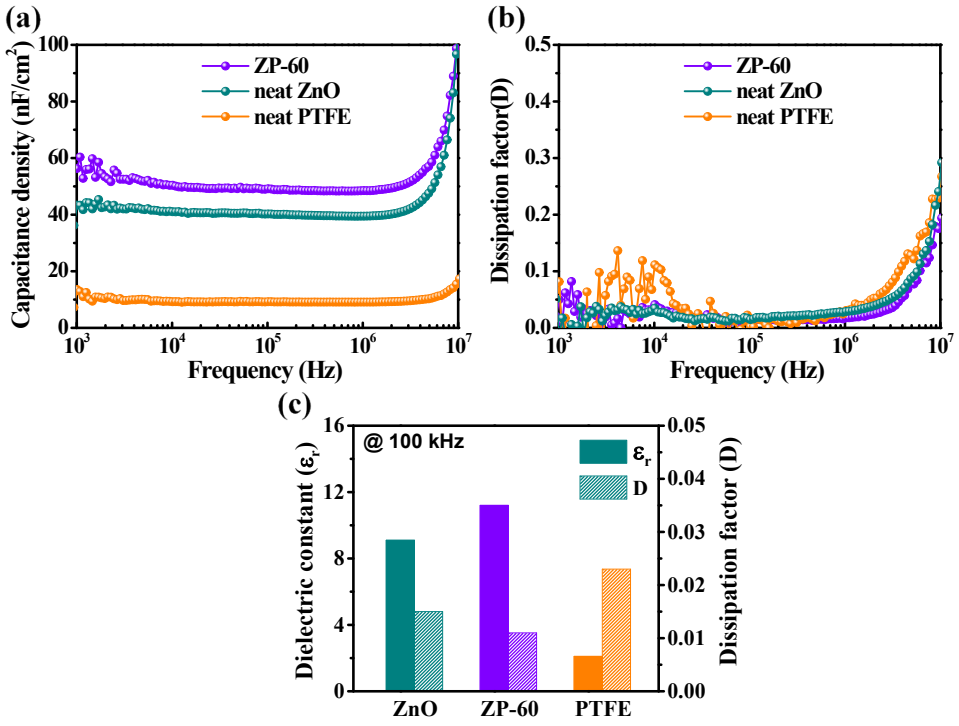

Fig. S14. The frequency-dependent a) capacitance density, b) dissipation factor curves of ZnO–PTFE composite film along with neat ZnO and neat PTFE films. and c) the corresponding summary of both dielectric constant and dissipation factor values obtained at 100 kHz frequency.

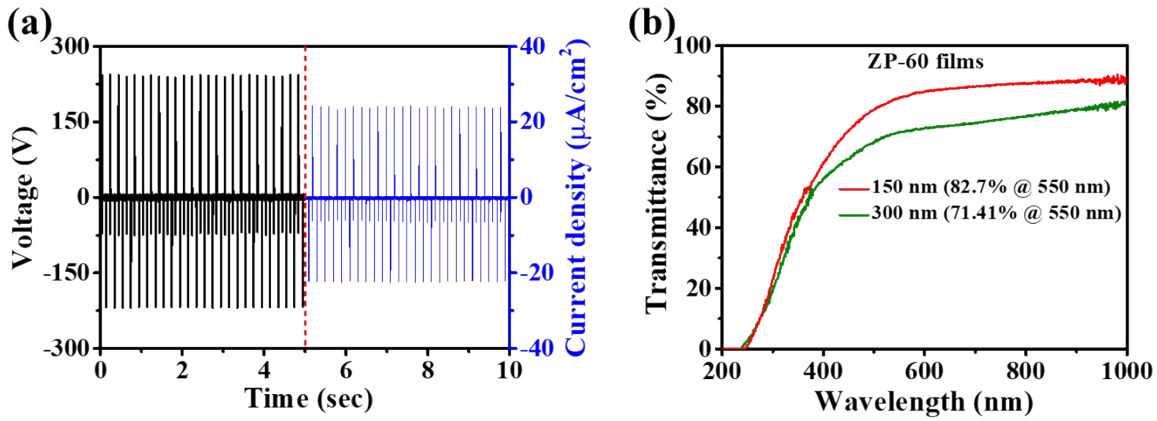

Fig. S15. a) The triboelectric output voltages of 300 nm thick ZP-60 film based single-electrode TENG under applied pressure/frequency of 10 kPa/5 Hz. b) The UV-Transmittance plot of 150 nm and 300 nm thick ZP-60 thin films.

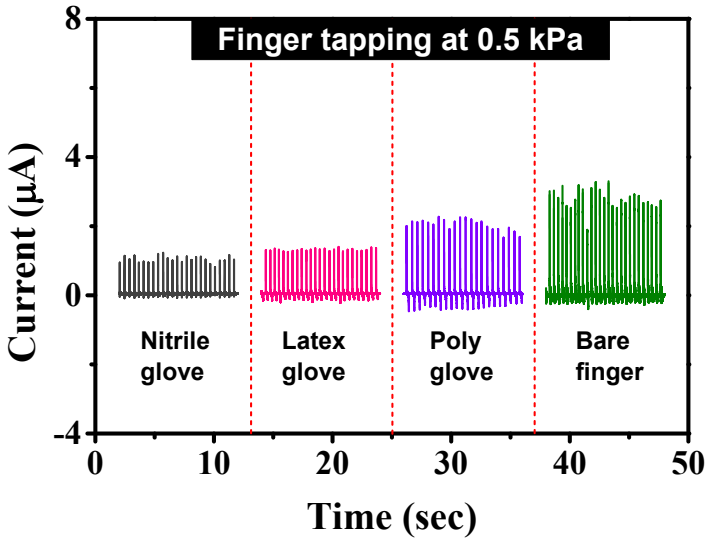

Fig. S16. The characterization of triboelectric output currents of ZP-60 film based single-electrode TENG under finger tapping by wearing different kinds of gloves.

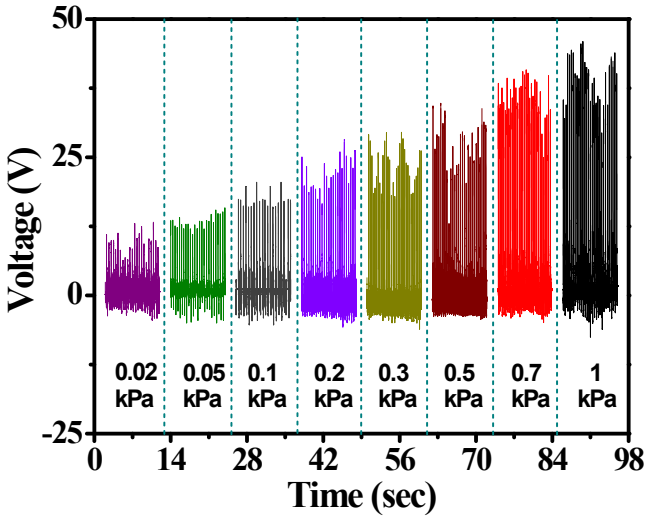

Fig. S17. The touch force-dependent output voltages of 150 nm thick ZP-60 film based single-electrode TENG under tapping.

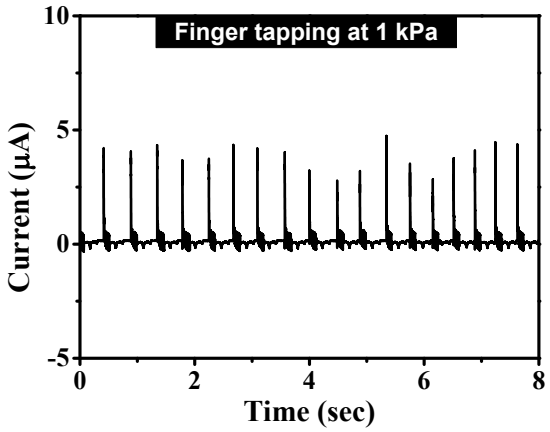

Fig. S18. The generated output current signals by the of 150 nm thick ZP-60 film based single-electrode TENG under finger tapping at an applied pressure of 1 kPa.

Supporting Videos

Video S1. Demonstration of retention of screen function with the ZP-60 coating.

Video S2. Demonstration of retention of antibacterial touch screen function with the ZP-60 coating.

Video S3. Operating a calculator by the stored output in 4.7 μF capacitor from the ZP-60 TENG output.

Video S4. Instant powering of commercial green LEDs by the generated output power from ZP-60 TENG under hand tapping.