Electronic Supplementary Information

Enhanced chemical and physical properties of PEDOT doped by anionic polyelectrolytes prepared from acrylic derivatives and application to nanogenerators

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Figure S1. Chemical structures of PSS, P(SS-co-HBA), P(SS-co-CEA), and their $^1$H-NMR spectra (d).

Figure S2. ATR-FTIR spectra of PSS (a), P(SS-co-HBA) (b), and P(SS-co-CEA) (c) at annealing temperatures; RT (black), 60 °C (red), and 140 °C (blue).
Figure S3. Contact angle images of DI water droplets on PSS film (RT (a)), (60°C (b)), (140°C (c)), P(SS-co-HBA) film (RT (d)), (60°C (e)), (140°C (f)), and P(SS-co-CEA) film (RT (g)), (60°C (h)), (140°C (i)) with various annealing temperature.

Figure S4. Topographic (left) and phase (right) images of PEDOT:PSS (a-c), PEDOT:P(SS-co-HBA) (d-f), and PEDOT:P(SS-co-CEA) (g-i) films; RT (a, d, g), 60 °C (b, e, h), and 140 °C (c, f, i).
Figure S5. Resistance changing ratio with bending test at speed (5 mm/s) with displacement (2 mm) for 1,000 cycles of PET films deposited PEDOT:PSS, PEDOT:P(SS-co-HBA), and PEDOT:P(SS-co-CEA) at RT, 60 °C, and 140 °C annealing (a). Before bending (b) and after bending (c).

Figure S6. Schematic illustration of PVDF-based piezoelectric nanogenerator and its working mechanism in a stretching and releasing cycle; without strain (a), stretching (b), and releasing (c).
Figure S7. Output voltages, currents and power of PNG-(1-3)(RT and 60) at various load resistance

Figure S8. Output voltages, currents and power of PNG-(1D-3D)(RT and 60) at various load resistance
Figure S9. Initial output voltages of PNG-1D(60) (black), PNG-2D(60) (red), and PNG-3D(60) (blue). The output voltages after 20 days of PNG-1D(60) (magenta), PNG-2D(60) (olive), and PNG-3D(60) (navy).

Figure S10. Charging voltage curves (RT (a) and 60 °C (b)) at 1 Hz of 1μF capacitor, comparison of charging voltage performance between 1 Hz and 5 Hz condition (c). Charging circuit diagram (d)
Table S1. The charging voltage performance at various conditions with PNG-(1-3)(RT) and PNG-(1-3)(60)

| Charging V in 60s | 1 Hz | 2 Hz | 3 Hz | 4 Hz | 5 Hz |
|-------------------|------|------|------|------|------|
| PNG-1(RT)         | 0.80 | 1.55 | 2.12 | 2.69 | 3.26 |
| PNG-2(RT)         | 0.86 | 1.68 | 2.49 | 3.26 | 3.98 |
| PNG-3(RT)         | 0.86 | 1.60 | 2.25 | 2.94 | 3.60 |
| PNG-1(60)         | 0.80 | 1.55 | 2.27 | 2.94 | 3.55 |
| PNG-2(60)         | 0.97 | 1.95 | 2.88 | 3.77 | 4.63 |
| PNG-3(60)         | 0.90 | 1.69 | 2.36 | 3.06 | 3.73 |