Supporting Information

for

**PEDOT:PSS versus Polyaniline: A Comparative Study of Conducting Polymers for Organic Electrochemical Transistors**

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**General Measurements**

A patterned electrode (BAS 0011598) was used as the substrate electrode of OECTs. A ultraviolet ozone cleaner (TECHNOVISION, INC. UV-208) was used to clean the substrate of OECTs. A spin coater used was MIKASA MS-B100. For thermal annealing, a digital hotplate of CORNING PC-400D was used. Output and transfer characteristics were measured using a parameter analyzer, KEITHLEY 4200A-SCS. Film thickness measurements were done with a surface prolifometer, KLA-Tencor D-100. Atomic force microscopy (AFM) was measured by using an SPI3800N and SPA300 with a stiff cantilever DF-20.

**Supporting Tables**

**Table S1** Characteristics of OECTs based on PEDOT:PSS

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Sample** | **P1000-5s** | **P1500-5s** | **P2000-5s** | **P2500-5s** | **P3000-5s** | **P2000-0s** | **P2000-5min** | **P2000-15min** | **P2000-1h** | **P2000-18h** |
| **ON Resistance****[Ω]** | 1400 | 1200 | 1160 | 1300 | 1470 | 940 | 1310 | 1350 | 1310 | 1080 |
| **Resistivity****[Ω・m]** | 0.12 | 0.090 | 0.067 | 0.065 | 0.055 | 0.052 | 0.075 | 0.078 | 0.075 | 0.062 |
| **Conductivity****[S/m]** | 8.16±0.23 | 11.1±0.4 | 15.0±1.6 | 15.4±1.4 | 18.1±1.7 | 19.3±1.7 | 13.3±1.4 | 12.9±1.4 | 13.3±1.4 | 16.1±1.8 |
| **Thickness****[nm]** | 350±10 | 300±11 | 230±25 | 200±18 | 150±14 | 220±19 | 230±25 | 230±25 | 230±25 | 230±25 |

**Table S2** Characteristics of OECTs based on PANI

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Sample** | **PA1000-5s** | **PA1500-5s** | **PA2000-5s** | **PA2500-5s** | **PA3000-5s** | **PA1500-0s** | **PAD1500-5s** | **PAD3000-5s** | **PAD1500-0s** |
| **ON Resistance****[Ω]** | 2790 | 3380 | 3410 | 3750 | 3990 | 2920 | 3770 | 4710 | 4240 |
| **Resistivity****[Ω・m]** | 1.10±0.04 | 1.13±0.03 | 0.96±0.03 | 0.98±0.03 | 0.98±0.03 | 0.83±0.01 | 0.91±0.06 | 0.99±0.02 | 1.29±0.02 |
| **Conductivity****[S/m]** | 0.91±0.04 | 0.88±0.03 | 1.05±0.04 | 1.03±0.03 | 1.02±0.03 | 1.20±0.01 | 1.09±0.07 | 1.01±0.02 | 0.77±0.01 |
| **Thickness****[μm]** | 1.57±0.06 | 1.34±0.04 | 1.12±0.04 | 1.04±0.03 | 0.98±0.03 | 1.14±0.01 | 0.97±0.06 | 0.84±0.02 | 1.22±0.02 |

**Table S3** Surface roughness (Ra) of PEDOT:PSS films

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Sample** | **P1000-5s** | **P2000-5s** | **P3000-5s** | **P2000-0s** | **P2000-5min** | **P2000-15min** | **P2000-18h** |
| **1μ**$m^{2}$**[nm]** | 2.72±0.07 | 2.84±0.09 | 2.47±0.14 | 2.68±0.20 | 2.56±0.14 | 2.43±0.12 | 1.73±0.10 |
| **10μ**$m^{2}$**[nm]** | 4.51±0.52 | 4.62±0.54 | 3.44±0.34 | 3.83±0.24 | 4.76±0.43 | 3.05±0.39 | 2.71±0.16 |

**Table S4** Surface roughness (Ra) of PANI films

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Sample** | **PA1500-5s** | **PA3000-5s** | **PA1500-0s** | **PAD1500-5s** | **PAD3000-5s** | **PAD1500-0s** |
| **1μ**$m^{2}$**[nm]** | 0.652±0.03 | 0.764±0.03 | 0.841±0.05 | 0.761±0.07 | 0.708±0.04 | 0.784±0.06 |
| **10μ**$m^{2}$**[nm]** | 3.78±1.49 | 3.94±1.28 | 6.07±1.45 | 3.17±0.52 | 5.31±1.19 | 1.78±0.25 |