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[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[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[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[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 |