Supplementary Material for

Isotropic charge transport in highly ordered regioregular poly(3-hexylthiophene) monolayer

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Table S1: Results of experimental measurements using cross-type electrodes.

Figure S1: Anisotropy of conductivity measured for polydiacetylene bi-layer using same cross-type electrodes.
Table S1: Results of experimental measurements using cross-type electrodes. These data are plotted in Figure 3 in main text. Small leakage current, which was generally less than 1nA, was sometimes observed at high gate voltage with low drain voltage in the devices #1-12. The leakage current were quite similar each other in same cross-type electrode. Therefore, it is considered that the leakage will not seriously affect the results for estimations of conductivity and mobility. Quite large leakage current, were observed in three devices #13-15. These data were eliminated from discussions of anisotropy.

| Sample No. | Polymer chain direction | Channel length L (nm) | Channel width W (nm) | ρ (Ω-1) | ρ/ρ⊥ | σ (×10^2 S/cm) | σ/σ⊥ | dI/dV_G (V_G=-10V) | V_d(V) (×10^2 cm²/Vs) | µ/µ⊥ |
|------------|------------------------|-----------------------|----------------------|---------|-------|-----------------|------|-------------------|----------------------|------|
| #1         | //                     | 333 267              | 219E-09              | 1.048   | 3.08  | 1.109           | 1.53E-09 | -3                | 2.04                 | 1.31 |
|            | //                     | 368 333              | 2.09E-09              | 1.440   | 2.77  | 1.580           | 1.42E-09 | -6                | 1.06                 | 0.96 |
| #2         | //                     | 368 333              | 7.22E-10              | 0.943   | 2.59  | 1.034           | 4.77E-09 | -13               | 1.07                 | 1.18 |
| #3         | //                     | 450 326              | 8.82E-09              | 0.873   | 14.87 | 0.700           | 8.93E-09 | -13               | 3.29                 | 0.89 |
| #4         | //                     | 490 323              | 1.01E-08              | 0.653   | 0.60  | 0.523           | 1.23E-09 | -6                | 0.98                 | 0.94 |
| #5         | //                     | 490 323              | 5.47E-10              | 1.15    | 1.15  | 1.04E-09        | 1.04E-09 | -10               | 1.04                 | 1.04 |
| #6         | //                     | 501 322              | 9.95E-10              | 1.47    | 1.47  | 1.24E-09        | 2.99E-09 | -10               | 1.03                 | 0.98 |
| #7         | //                     | 509 322              | 2.70E-09              | 1.084   | 3.62  | 1.274           | 2.16E-09 | -10               | 0.82                 | 1.25 |
| #8         | //                     | 509 322              | 4.44E-10              | 0.965   | 0.59  | 1.134           | 6.50E-10 | -10               | 0.25                 | 1.15 |
| #9         | //                     | 501 322              | 4.68E-10              | 0.52    | 0.52  | 1.04E-09        | 6.60E-10 | -10               | 0.21                 | 1.15 |
| #10        | //                     | 509 322              | 2.15E-09              | 1.070   | 3.39  | 1.278           | 1.95E-09 | -10               | 0.87                 | 1.11 |
| #11        | //                     | 501 322              | 2.01E-09              | 2.66    | 2.66  | 1.24E-09        | 2.10E-09 | -10               | 0.79                 | 1.11 |
| #12        | //                     | 509 322              | 1.82E-09              | 1.083   | 3.15  | 1.226           | 1.43E-09 | -3                | 2.34                 | 1.19 |
| #13        | //                     | 501 322              | 8.61E-09              | 9.09    | 8.95  | 1.106           | 1.02E-08 | -15               | 3.05                 | 0.95 |
| #14        | //                     | 509 322              | 1.68E-09              | 8.95    | 8.95  | 1.106           | 1.08E-08 | -15               | 3.02                 | 0.93 |
| #15        | //                     | 501 322              | 1.21E-08              | 1.080   | 16.56 | 0.986           | 8.72E-09 | -15               | 2.26                 | 0.96 |

Sample No. | Polymer chain direction | Channel length L (nm) | Channel width W (nm) | ρ (Ω-1) | ρ/ρ⊥ | σ (×10^2 S/cm) | σ/σ⊥ | dI/dV_G (V_G=-10V) | V_d(V) (×10^2 cm²/Vs) | µ/µ⊥ |
|------------|------------------------|-----------------------|----------------------|---------|-------|-----------------|------|-------------------|----------------------|------|
| #13        | //                     | 412 330              | 7.77E-10              | 1.615   | 1.02  | 1.546           | 6.81E-10 | -3                | 0.84                 | 41.77 |
| #14        | //                     | 410 330              | 4.76E-10              | 0.870   | 0.66  | 0.976           | 4.78E-10 | -3                | 0.63                 | 19.78 |
| #15        | //                     | 400 345              | 2.04E-09              | 0.843   | 2.19  | 0.812           | 1.88E-10 | -10               | 0.07                 | 0.29 |
Figure S-1: a Current-Voltage characteristics of polydiacetylene bi-layer measured using a cross-type electrode. b AFM image and c schematic drawing of the polydiacetylene layer covering the electrode. Polymer direction and number of layer can accurately be determined by AFM image. The polymer film were fabricated by diacetylene monomer deposition in vacuum and subsequent ultra violet light irradiation. I-V and AFM measurement were carried out in atmosphere ambient condition.