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Polymer-based organic memory transistors for flexible electronics

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ABSTRACT

Flexible electronics has quickly approached and now being one of the hot issues in our daily life since foldable smartphones have been commercialized last year. However, the present state-of-the-art technologies in foldable smartphones are considered an intermediate level because the embedded electronic components are still hard and rigid without sufficient flexibility. To realize genuine flexible electronics, all components need to be soft and flexible in the presence of a very small margin of rigidity. In reality, most of the electronic components cannot be subjected to such high flexibility when it comes to their constituents including inorganic semiconducting materials as well as metallic electrodes. To make breakthroughs on semiconducting materials, organic electronics has been a good candidate and enthusiastically studied by various research groups. Besides, a couple of challengeable approaches have been made for soft electrodes. Our group has attempted to make flexible organic electronic devices such as organic solar cells, organic tactile sensors, organic phototransistors, organic energy storage devices, organic memory devices, etc. Of these future-oriented attempts, organic memory devices based on organic field-effect transistors have recently shown a reasonable performance comparable to conventional inorganic memory devices. In particular, organic nonvolatile memory transistors with particular polymer nanolayers exhibited low-voltage operation features with high retention characteristics. This presentation aims to briefly demonstrate our efforts on organic memory devices and introduce very recent results together with future directions in this field.

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