Fabrication of Chiral Organic Semiconductor Nanowires and Application in Circularly Polarized Light Detection

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Chirality plays a very important role in scientific and technological research fields with huge potential to be applied in key areas including chemical synthesis, pharmaceutics, catalysis, fundamental physics and biomedicals. However, the separation of chiral molecules is still a challenge for their practical use in chemical and pharmaceutical industries. The most widely used characterizations rely on the traditional methods of measuring the circular dichroism using circularly polarized light. In this research, we have successfully synthesized chiral materials, i.e., CPDI-Ph derivatives, and self-assmbled them into nanowires. The prepared 1-D nanomaterials show excellent n-type organic field-effect transistor (OFET) performance and high photo-responsivity under monochromic light irradiations. More importantly, specific photo-responses were obtained from chiral semiconductors upon illuminating circularly polarized light on the active layer of the n-type OFETs, which demonstrates the first example for detecting circularly polarized light from n-type phototransistors based on photoactive 1-D nanomaterials.