CURRENT-VOLTAGE CHARACTERISTICS, RELAXATION PROPERTIES, AND PHOTOSENSITIVITY OF POLYTHIOPENTACENE FILMS

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S u m m a r y

The hysteresis of dark current-voltage characteristics (JVC) has been observed for the first time for polythiopentacene (PTP) films 1540 nm in thickness in sandwich-like ITO(PTP)Ag cells at room temperature and in the range of applied voltages V from 0 to 10 V. At the negative polarity of the ITO electrode, the dark current density J was found to diminish to a stationary value with the time constants $\tau_1 = 10$ s and $\tau_2 = 150$ s. If the polarity of this electrode was positive, the current-density reduction with $\tau_1 = 10$ s was followed by the current-density increase with $\tau_2 = 150$ s. The time dependences of J, the densities of the short circuit current, $J_{\rm sc}$, and photocurrent, $J_{\rm ph}$, and, hence, the algebraic sum $J_{\rm sc} + J_{\rm ph}$ were found to be governed by relaxation changes in the magnitudes of near-electrode space charges. The photosensitivity S_0 of PTP films at their illumination with monochromatic light with a quantum energy of 1.51 eV (photogeneration in the bulk) turned out five times as high as that, when the light quantum energy was 1.77 eV (photogeneration near the electrode). The near-electrode photogeneration is characterized by the presence of horizontal and linearly increasing sections in the dependence $S_0(V)$, which are associated with linear and quadratic, respectively, variations of the sum $J_{\rm sc} + J_{\rm ph}$ with the changing voltage V. For photogeneration in the bulk, this sum depends linearly on V.