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**Study of carrier-mobility of organic thin film by dark-injection
time-of-flight and electric-field-induced optical second-harmonic
generation measurements**

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Abstract

By using dark-injection time-of-flight (ToF) and time-resolved electric-field-induced optical second-harmonic generation (EFISHG) measurements, we studied carrier mobility μ of pentacene (Pen) thin film of ITO/Pen/Al and Au/Pen/polyimide/ITO diodes where pentacene film is ~ 100 nm in thickness. ToF showed that determination of transit time t_r from trace of transient currents is difficult owing to large capacitive charging current. On the other hand, optical EFISHG is free from this charging current, and allows us to calculate hole and electron mobility as $\mu_h=1.8\times 10^{-4}$ cm²/Vs and $\mu_e=7.6\times 10^{-7}$ cm²/Vs, respectively, by using the relation $t_r = d/\mu \int_{t_c}^{t_r} E(0)dt$ (d : Pen thickness, $E(0)$: electric field across Pen), instead of the conventional relationship $t_r = d^2/\mu V$ (V : voltage across Pen). Time-resolved EFISHG measurement is useful for the determination of carrier mobility of organic thin film in

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