Voltammetric Investigation for Electron-Transfer Characteristics of Organic Semiconductors

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doi: 10.20964/2016.07.14

Received: 22 March 2016 / Accepted: 29 April 2016 / Published: 4 June 2016

Two voltammetric techniques, cyclic voltammetry (CV) and chronocoulometry (CC), were employed to investigate the redox characteristics of two organic semiconductors in organic light-emitting diodes (OLED), *fac*-tris(2-phenylpyridine)iridium ($\text{Ir}(\text{ppy})_3$) and N,N'-di(1-naphthyl)-N,N'-diphenyl-(1,1'-biphenyl)-4,4'-diamine (NPB). The electron-transfer characteristics including of oxidation formal potentials (E^0), diffusion coefficients (D_0), electron-transfer rate constants (k^0) were estimated by the combination of CV and CC measurements. The energy level of the highest-occupied molecular-orbital (E_{HOMO}) was also found by quantitative relationship between the oxidation potential and the ionization energy.

Keywords: *fac*-tris(2-phenylpyridine)iridium, N,N'-di(1-naphthyl)-N,N'-diphenyl-(1,1'-biphenyl)-4,4'-diamine, highest-occupied molecular-orbital, cyclic voltammetry, chronocoulometry, Anson plot, Nicholson method, quasi-reversible process, electron-transfer rate constant, diffusion coefficient, oxidation formal potentials

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