

Photochromic Properties of Naphthalene-Bridged PIC Derivatives

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The negative photochromism which can be operated with visible light is expected for the application to advanced photofunctional materials. Negative photochromism showing rapid thermal back reaction within a millisecond time scale is useful for the real-time switching of molecular properties. In our laboratory, we have developed negative photochromic molecules such as naphthalene-bridged phenoxyl-imidazolyl radical complex (**Np-PIC**).^[1] **Np-PIC** (**1**) shows fast thermal back reaction rate with a millisecond time scale, but **Np-PIC** does not show the color change because the 1,4'-isomer and the 2,4'-isomer have the absorption band only in the UV light region. In this study, we synthesized **Np-PIC** derivatives (**2-6**). We investigated photochromic properties of **2-6** by the DFT calculation, the cyclic voltammetry, and the transient absorption spectra and demonstrated the efficient strategy to enhance the visible light sensitivity and to control the thermal back reaction rates.^[2]

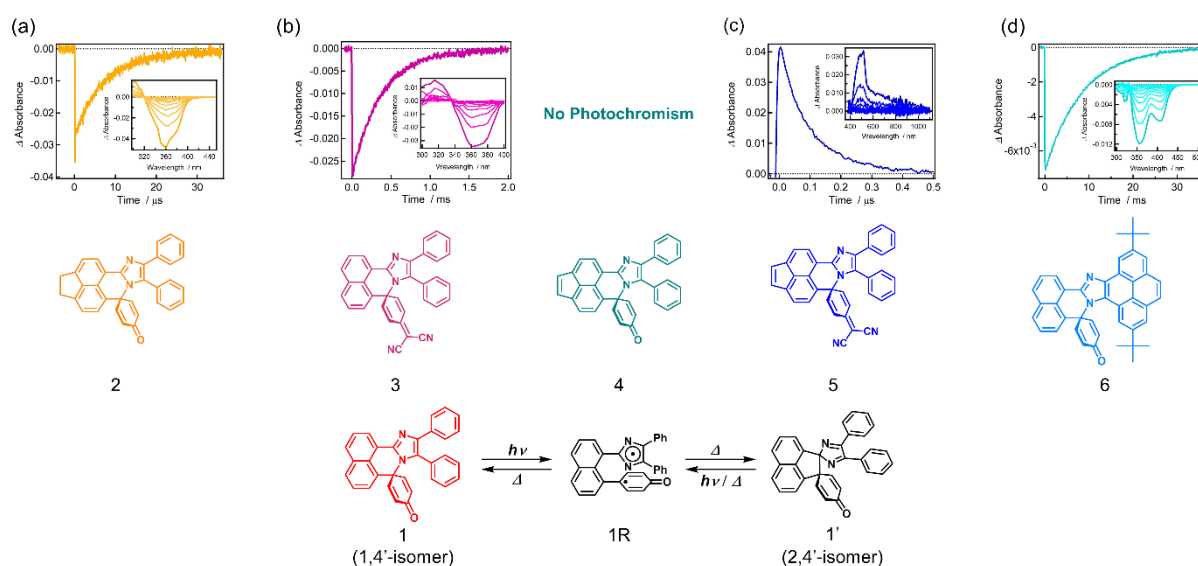


Figure 1. Transient absorption spectra and the time profiles of the transient absorbance of (a) **2**, (b) **3**, (d) **6** upon 355-nm nanosecond laser pulse (4 mJ) at 298 K in benzene, and (c) **5** upon 355-nm picosecond laser pulse (1 kHz, 8 mW) at 298 K in benzene.

[1] Mutoh, K.; Kobayashi, Y.; Hirono, Y.; Abe, J., *Chem. Commun.*, **2016**, 52(16), 6797-6800.

[2] Ito, H.; Mutoh, K.; Abe, J., *ChemPhysChem.*, **2020**, 21, 1578–1586.