

Negative Photochromism of Biphenyl Bridged Imidazole Dimer Derivatives

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Negative photochromism is one of the reversible chemical reactions from a thermally stable colored isomer to the colorless isomer by light irradiation. On the other hand, positive photochromism shows the reversible chemical reactions from the thermally stable colorless isomer to the colored isomer by light irradiation.

Recently, we reported that a biphenyl bridged imidazole dimer shows positive photochromism which changes its color from colorless to colored. On the other hand, we also reported that a binaphthyl bridged imidazole dimer shows negative photochromism which changes the color from red to colorless by light irradiation. These reports suggest that the bridge moiety plays an important role to determine whether the bridged imidazole dimers show positive or negative photochromism. However, the factors of these two phenomena are still unclear.

In this study, we synthesized a biphenyl bridged imidazole dimer derivative which has two Br groups at the 2- and 2'-position of the biphenyl moiety and investigated the photochromic properties. Although the non-substituted biphenyl bridged imidazole dimer shows positive photochromism, the Br-substituted biphenyl bridged imidazole dimer derivatives shows negative photochromism. The yellow-colored compound synthesized in this study generates two isomers, the red colored isomer and the colorless isomer, via the transient biradical species by light irradiation. It also shows negative photochromism. The isomerization mechanism will be discussed in this presentation.

References:

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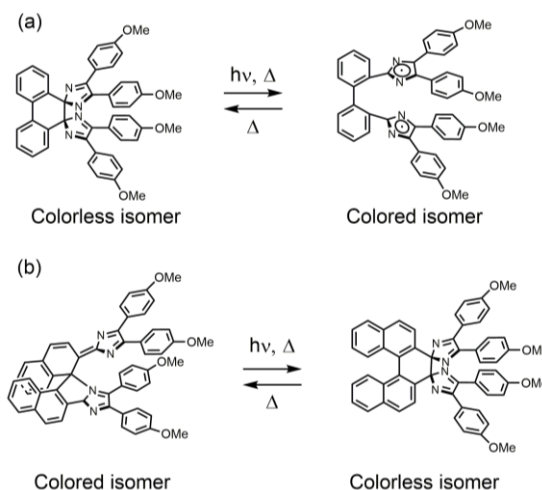


Figure 1. Photochromic reactions of (a) biphenyl bridged imidazole dimer and (b) binaphthyl bridged imidazole dimer.