

論文 / 著書情報
Article / Book Information

題目(和文)	累積二重結合の反応を基盤とする1,3-ジエン類の合成と特異な光学特性
Title(English)	Synthesis and Unique Optical Properties of 1,3-Dienes Based on Reactions of Cumulated Double Bonds
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Type(English)	Outline

On the basis of the reactivity of cumulative carbon-carbon double bonds, the author has described the synthesis and unique optical properties of the highly substituted 1,3-diene derivatives. This thesis consists of 6 chapters, and the outline for each chapter is shown as follows.

In Chapter 1, the research background related to the 1,3-diene derivatives exhibiting unique properties such as electrochromism and aggregation-induced emission (AIE) behavior is illustrated. The potentials of cumulative carbon-carbon double bonds for the synthesis of highly substituted 1,3-diene derivatives are also described.

In Chapter 2, the synthesis and electrochromic properties of 1,1,4,4-tetra-aryl-1,3-butadiene possessing sulfur functional groups on their 2- and 3-positions from tetra-arylbutatriene is described. The obtained sulfur-substituted tetra-aryl-1,3-butadiene exhibited electrochromic behaviors, especially bis(thioether) derivatives were found to be an attractive electrochromic dye from the view of the vivid color change.

In Chapter 3, the synthesis and electrochromic behaviors of the mononuclear nickel dithiolate complexes possessing 1,1,4,4-tetra-aryl-1,3-butadiene moiety are described. The spectroelectrochemical experiments revealed that the obtained nickel complexes exhibited two-stage electrochromic behavior, whose color changes depended on the nature of neutral ligands.

In Chapter 4, the synthesis and AIE properties of 1,2-bis(diarylmethylene)cyclobutanes are described. A series of 1,2-bis(diarylmethylene)cyclobutanes are prepared by a regio- and chemo-selective cyclodimerization of 1,1-diaryllallenes mediated by a stoichiometric amount of $\text{Ni}(\text{PPh}_3)_4$. The cyclic dimers exhibit excellent AIE properties whose quantum yield reaches 85% in the solid state.

In Chapter 5, the cyclodimerization reaction of asymmetrically 1,1-disubstituted allenes and photoluminescent properties of the obtained cyclic dimers are described. Aryllallenes having thiophene or methyl substituent were subjected to the cyclodimerization reaction mediated by the nickel complex to produce the corresponding 1,2-dimethylenecyclobutanes derivatives, whose emission color could be controlled by the substituents.

In Chapter 6, the author has summarized the works described in Chapters 2-5, and described the future perspectives.