

光学活性なビス-1,8-ナフタリイミド誘導体およびその類縁体のエキシマー蛍光に基づく円偏光発光特性

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Circularly Polarized Emission Properties of Optically Active Bis-1,8-Naphthalimide Derivatives and Their Analogues Based on Excimer Fluorescence (¹*Graduate School of Humanities and Sciences, Nara Women's University*, ²*Kindai University*, ³*Osaka University*, ⁴*Nara University of Education*, ⁵*Kyoto University*) ○Mami Naoe,¹ Hiroshi Takashima,¹ Yoshitane Imai,² Norimitsu Tohnai,³ Shoko Yamazaki,⁴ Eiji Nakata⁵

Organic light-emitting dyes emitting circularly polarized light have been actively studied due to their photophysical behavior. We have compared the luminescence properties of optically active bis-1,8-naphthalimide derivatives (*D,L*-LybNI and *D,L*-LyMebNI) as shown in Fig. 1 (a) and (b) in several solvents: in MeCN for *D,L*-LyMebNI the $|g_{lum}|$ values were $1.9 \times 10^{-3}(D)$ and $1.6 \times 10^{-3}(L)$, and CPL derived from intramolecular excimer formation was successfully observed¹⁾. In addition, with the aim of observing intramolecular excimer in various solvents and CPLs exhibiting higher $|g_{lum}|$ and B_{CPL} values ($B_{CPL} = \epsilon\Phi|g_{lum}|/2$, ϵ is the molar absorption coefficient and Φ is the fluorescence quantum yield), we further extended the π -electron plane and synthesized analogues with controlled chirality (Fig. 1 (c), (d)) and investigated their photophysical properties, which showed excimer emission in MeCN.

Keywords : Optical Properties; Fluorescence; Naphthalimide; Circularly Polarized Luminescence, Excimer

円偏光発光 (CPL) を発する有機発光色素は、その光物理的挙動により活発に研究されている。これまでに、Fig.1 (a), (b)に示すような光学活性ビス-1,8-ナフタリイミド誘導体(*D,L*-LybNI, *D,L*-LyMebNI)の発光特性について、いくつかの溶媒中での比較検討を行った。*D,L*-LyMebNIにおける MeCN 中での $|g_{lum}|$ 値は $1.9 \times 10^{-3}(D)$, $1.6 \times 10^{-3}(L)$ であり、分子内エキシマー形成由来の CPL の観測に成功した¹⁾。また、様々な溶媒での分子内エキシマー形成と、より高い $|g_{lum}|$ 値および B_{CPL} 値 ($B_{CPL} = \epsilon\Phi|g_{lum}|/2$, ϵ はモル吸光係数、 Φ は蛍光量子収率)を示すCPLを観測することを目的として、 π 電子平面をさらに拡張し、キラリティーの制御された類縁体 (Fig.1 (c), (d)) の合成を行い、その光物性を調べたところ MeCN 中でエキシマー発光を示した。

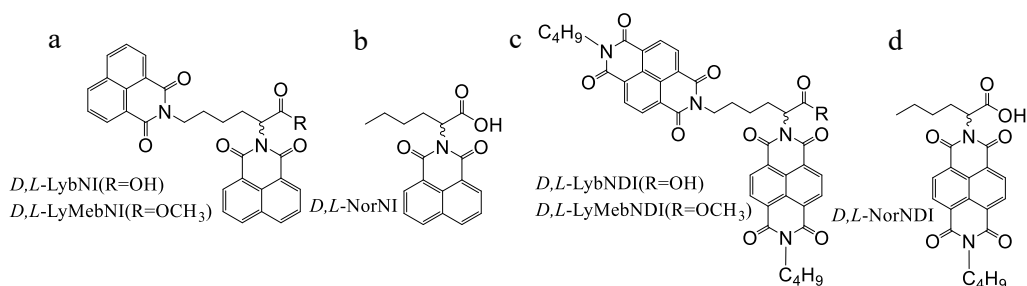


Fig.1. Bis-1,8-naphthalimide derivatives and their analogues.

- 1) S. Eguchi, M. Naoe, A. Kageyama, Y. Imai, N. Tohnai, S. Yamazaki, E. Nakata, H. Takashima, *Org. Biomol. Chem.*, 2024, **22**, 4318-4325.