蛍光性フルオレン誘導体の合成とキラルネマチック液晶により誘起される円偏光発光の特性

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Synthesis of Fluorescent Fluorene Derivative Exhibiting Circularly Polarized Luminescence Induced by Chiral Nematic Liquid Crystals ([1] *College of Life Sciences, Ritsumeikan University*, [2] *Research Organization of Science and Technology, Ritsumeikan University*, [3] *KANEKA CORPORATION*) ○Yuki Fujita,[1] Keita Horie,[2,3] Kosuke Kaneko,[1] Tomonori Hanasaki,[1] Kazuo Akagi[2]

It is required for chiroptical materials bearing circularly polarized luminescence (CPL) to have intended emission wavelengths, high quantum yields (ϕ), and high luminescence dissymmetry factors (g_{lum}). The addition of achiral luminophores into chiral nematic liquid crystal (N*-LC) is a promising way to generate CPLs. In this study, we aimed to generated red-green-blue (RGB) and white CPLs by adding three types of fluorene-based luminescent molecules and their mixture into N*-LCs. First, achiral fluorene derivatives with RGB emission colors were synthesized and added into the N*-LCs containing alkylcyanobiphenyl and alkylcyanoterphenyl-based N-LCs and an axially chiral binaphthyl dopant. The mixture of RGB fluorene derivatives was prepared with an appropriate mixing ratio and added into the N*-LC. The N*-LCs including the fluorene derivatives or the mixture were sandwiched between quartz glasses and measured for chiroptical properties. The fluorene derivatives dissolved in the N*-LCs exhibited induced CPLs of RGB and white colors with ϕ values of 40~80% and g_{lum} values of 0.7~0.8. These results indicate that the chirality transfer from N*-LCs to luminescent molecules is effective for producing RGB and even white CPLs.

Keywords : Circularly polarized luminescence; Chiral nematic liquid crystal; Luminescence dissymmetry factor

円偏光発光（CPL）を有する光学材料には、目的とする発光波長、高い量子収率(Φ)、および高い発光非対称性因子（g_{lum}）が必要とされる。CPL の発現方法としては、キラルネマチック液晶（N*-LC）にアキラルな蛍光物質を添加する方法が知られている。本研究では N*-LC に添加する蛍光物質の発光波長の調整を行い、RGB および白色の CPL の誘起を試みた。まず、RGB 発光色のアキラルなフルオレン誘導体を合成し、軸不斉型キラルドーパントを含む N*-LC に添加した。各 N*-LC を石英ガラスで挟み、CPL 特性を評価した。RGB の CPL および混合系の白色 CPL は Φ = 40-80%、g_{lum} = 0.5-0.6 と良好な値を示した。

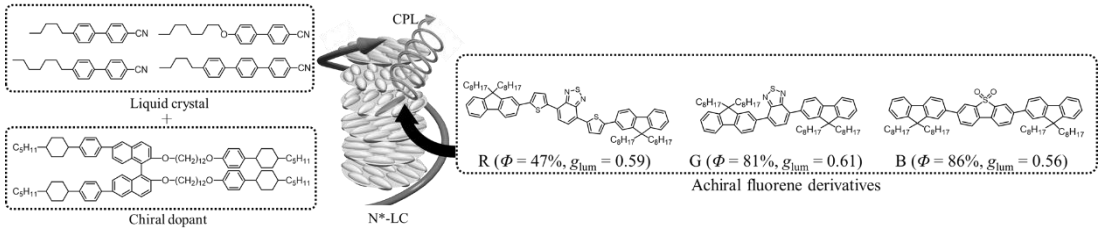

図 1 ネマチック液晶系、キラルドーパント、および RGB 発光色のフルオレン誘導体