

CD/CPL のための新たな測定法の提案

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Innovative Circular Dichroism and Circularly Polarized Luminescence Measurement Methods
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Circularly polarized luminescence (CPL) spectroscopy measures the difference in fluorescence intensity between left- and right-circularly polarized light. CPL spectroscopy has been used to analyze the structure of chiral molecules in their excited state. Recently, it has found an increasing range of applications in the analysis of molecules that emit circularly polarized light and can be used in 3D displays, and the number of articles focusing on CPL spectroscopy has increased dramatically.

Until now, the principal targets of CPL measurements have been solution samples. However, for practical device applications, it is also necessary to measure CPL spectra from solid state samples. In addition, since electronic devices often operate at high temperatures, it is important to evaluate the thermal dependence of CPL characteristics.

To this end, JASCO has developed various accessories for the CPL-300 spectrophotometer. In this presentation, we describe CPL spectra of solid samples obtained at high temperatures using the CPL-300 spectrophotometer. We also introduce a technique referred to as magnetic circularly polarized luminescence (MCPL) spectroscopy that uses a small permanent magnet.

Keywords : CPL; Europium complex; Solid-state CPL measurement; Temperature-dependent CPL measurements; Magnetic circularly polarized luminescence

CPL 測定法は光学活性物質が発する左右円偏光状態の蛍光強度の差を測定するもので、光学活性分子の励起状態の構造解析に用いられてきた。近年では 3D ディスプレイなどに応用が期待される円偏光発光分子の評価装置としても注目を集めており、CPL 測定法を用いた報告は飛躍的に増えている。

これまで CPL 測定の対象は主に溶液試料であった。しかしながら、円偏光発光材料として使用することを見据えると、最終的には固体状態での CPL 測定が望まれる^{1,2)}。また、デバイスとして使用した場合、周辺温度の上昇が起こるため、CPL 特性の温度依存性の評価も必要である³⁾。

これらの測定を実現するために、日本分光では CPL 測定装置 (日本分光社製 CPL-300) 用に様々なアクセサリを開発してきた。本発表では、CPL-300 を例に固体試料およびその高温状態での CPL 測定例を紹介する。また、小型永久磁石を用いた磁気円偏光発光 (MCPL) についても紹介する。

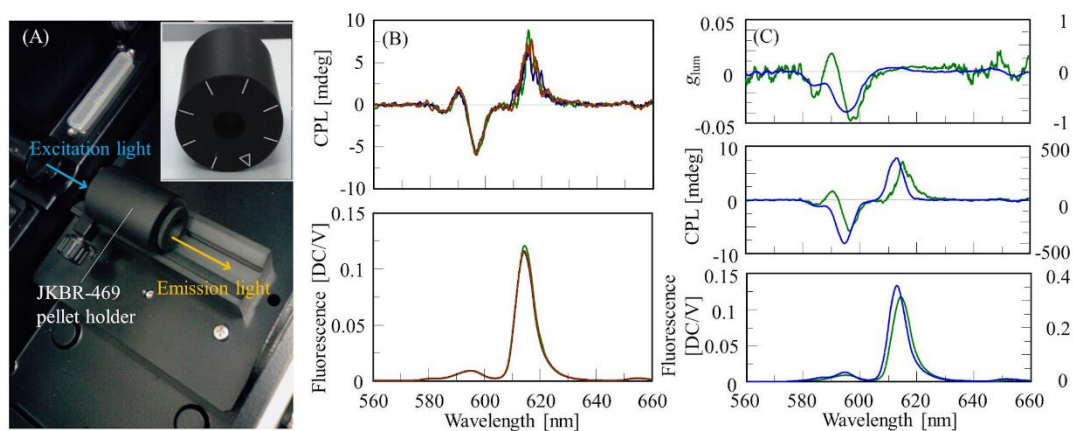


Fig.1 (A) Sample compartment of CPL-300 with installed JKBR-469 pellet holder, and front view of JKBR-469. (B) CPL and fluorescence spectra of $\text{Eu}(\text{facam})_3/\text{KBr}$ pellet at rotation angles of 0° (green), 45° (blue), and 90° (red). (C) g_{lum} , CPL and fluorescence spectra of $\text{Eu}(\text{facam})_3/\text{KBr}$ pellet (green, left vertical axis) and in DMSO solution (blue, right vertical axis).

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