Chirascan Circularly Polarized Luminescence Accessory


Introduction

Circularly Polarized Luminescence (CPL) provides information about the excited states of chiral molecules and finds use from materials physics to biology. Particularly, CPL is indispensable for the characterization of lanthanide complexes as molecular probes and in liquid crystals, and of pharmaceutical compounds such as polycyclic aromatics with application as anticancer drugs.

The Chirascan™ CPL Accessory allows the detection of weak CPL signals (\( \alpha_{\Delta \omega} \)) in the order of \( 10^{-7} \) at a typical Root Mean Square noise of 0.0014.

As the excitation beam is polarized horizontally and the emission polarizer is aligned vertically, the setup with its 90 degree geometry eliminates photoselection artifacts.

Chirascan CPL Accessory in situ

The CPL accessory is used with the standard temperature-controlled Single Cell Peltier Holder and easily replaced to install other accessories.

- Focusing lens and iris control light throughput
- Cut-off filter removes excitation light
- SEM selects emission wavelength and bandwidth

CPL and CD with the Same Setup

CPL is compatible with standard CD measurements. Signal modes are easily switched through a drop-down menu in the software for automatic selection of correct PEM, requiring no hardware changes.

Case Study: Characterization of Quinolone Cycles

Quinolone antibiotics are often used to treat genitourinary infections. A polymer consisting of quinolone cycles with the bicyclic core structure of 4-quinolone connected by amide bonds (Molecular formula: \( C_{472}H_{476}N_{66}O_{68} \), Molecular weight: 8605.89 Da) was analysed with a Chirascan V100™. Polymer samples at different concentrations in dichloromethane were analysed in a 1 cm pathlength cuvette.

Results

CPL Analysis

Dependence on concentration is removed by taking the ratio of \( \Delta \) to \( \frac{1}{2} \).

CD and Absorbance Analysis

Optimal absorbance range for CD (0.5 to 2 AU) corresponds to similar \( \Delta \) to \( \frac{1}{2} \) ratios and thus virtually identical \( \alpha_{\Delta \omega} \).

Identical \( \alpha_{\Delta \omega} \) obtained for wide range of sample concentrations.

Measurements can be optimized for CD so that both CD and CPL data can be obtained for the same sample.

Conclusions

Chirascan CPL Accessory enables comprehensive analysis of chiral luminophores and is compatible with CD measurements.

- CPL and CD measurements with same setup and sample
- Multiple ways for optimizing light throughput
- Full software integration for easy acquisition