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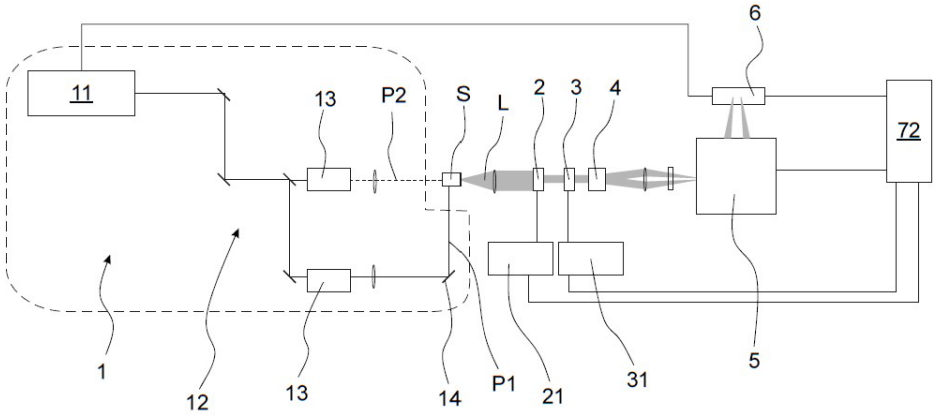
Licensing Opportunity

TTO – Technology Transfer Office

Polarization spectroscopy apparatus



Schematic block diagram of the luminescence polarization spectroscopy apparatus.

Ref. Nr

6.2618

Keywords

Circularly polarized luminescence, CPL, Stokes vector, chiral materials

Intellectual Property

US63/602,842 priority 27.11.2023
US 18/960,271 non-provisional 26.11.2024

Publications

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Date

03/12/2024

Description

State-of-the-art luminescence spectroscopy techniques for characterization of circularly polarized light face several limitations, including restricted sensitivity, limited resolution in polarization discrimination, discrimination of signal from artifacts, and the lack of time resolution. Current methods often struggle with accurate simultaneous detection of orthogonal polarization components and efficient handling of diverse spectral regions. The novel luminescence spectroscopy apparatus described herein addresses these limitations by integrating advanced optical components, such as wave plates, polarization beam splitters, and a time-gated intensified CCD chip. These innovations enable unprecedented ns-time-resolution at ms-range with broadband spectral detection, and 10^{-4} polarization accuracy, offering a transformative step forward for polarized light characterization.

Advantages

- Enhanced Sensitivity: Various error-cancellation methods reduce background noise and increase sensitivity to weakly luminescent or poorly polarized samples.
- Accurate Polarization Discrimination: Simultaneous detection of full Stokes vector polarization components ensures reliable characterization of circularly and linearly polarized light, and their discrimination from artifacts.
- Improved Flexibility: The system enables dynamic measurements across various experimental configurations on a small geometrical footprint.
- High Spectral Resolution: Broadband visible spectrum acquisition with every shot.

Applications

- Characterization of fluorescent markers and chiral molecules in drug development and diagnostics.
- Analysis of optical properties in nanostructured and quantum materials.
- Detection of luminescent pollutants or natural compounds.
- Development of devices utilizing circularly polarized light, such as OLEDs or quantum-dot displays.