Hokkaido Univ. Technology

Optical Vortex Generator and Analysis

Harnessing spiral light for measurement!

Overview

Chiral materials absorb right- and left-circularly polarized light differently (circular dichroism). Optical vortices, however, carry orbital angular momentum; their topological charge I can take unlimited integer values (± 1 , ± 2 , ± 3 , ...). Using this richer degree of freedom enables material characterization, chirality discrimination, and a new measurement modality ("optical-vortex dichroism") beyond conventional circular dichroism. Conventional vortex generators are limited to low-frequency modulation, leading to high noise and poor S/N. The invention engineers the optical system to achieve left-right vortex modulation at high frequency, reducing noise. We demonstrate detection of the "geometric twist" in twisted gold nanorod dimers (TND: paired, twisted nanoscale rods), suggesting defect detection in fine metallic wiring and applications in semiconductor, MEMS, and metamaterial inspection, as well as discovering new properties and enabling chirality identification.

Product Application

- Optical vortex generator, material analysis instrument
- Defect inspection for semiconductors, MEMS, metamaterials

IP Data

IP No. : Not published

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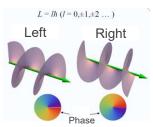
Admin No.: HK25-001

Features · Outstandings

Optical Vortex...

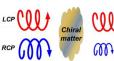
Circular polarization $\sigma = sh (s = \pm 1)$ LCP RCP

Optical Vortex

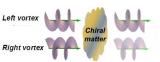


Optical vortex ... A wavefront with a helical structure

Standard CD



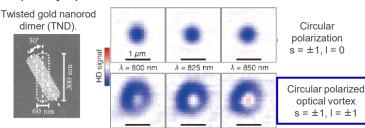
Optical vortex dichroism



A novel form of dichroism using optical vortices is proposed.

The invention

High-frequency optical vortex handedness modulation device



Confirming micro-metal torsion using this invention

- * Spectral measurement is also possible..
- * Not with conventional circularly polarization.

We welcome industry and academic partners interested in material analysis or chirality identification with the vortex technology.

Contact

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