

Birefringent Metal-Coordination Polymers

Highly birefringent materials have different refractive indices along different axes, and are used in optical data transmission and communication, microscopy, and light refocusing. Current commercially available solid birefringent materials are primarily inorganic minerals such as calcite, which has an extremely high birefringence (0.17). Very few known commercially available solid substances have birefringence values above 0.20. The Leznoff group at Simon Fraser University has developed a series of metalcoordination polymers with extremely high birefringences.

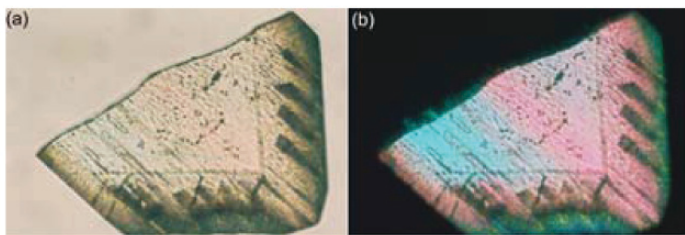


Figure 1: (a) Crystal under normal light. (b) Crystal under crossed polarizers; only a strongly birefringent crystal would be visible at all under these conditions.

The Problem

Current limitations of solid highly birefringent materials include:

- Usually inorganic minerals, e.g. calcite with 0.17 birefringence;
- Not easy to process or manufacture;
- Cannot readily form thin films;
- Cannot be altered to produce additional properties.

The Alternative

- Novelty - birefringent coordination polymers unknown;
- Refractive index 0.40 compared to 0.17 for calcite;
- Easy to synthesize and stable material;
- Modular synthetic procedure (easy to produce alternate properties);
- Commercially useful forms, e.g. thinfilms;
- Enables miniaturization of optical devices and coating of fibres and surfaces.

Applications

- Optical data transmission and communication;
- Microscopy;
- Birefringence-measuring instrumentation (calibration);
- Nonlinear optical materials (e.g. telecommunications);
- Light refocusing;
- Others (common-path profilometry systems, compact disc readers, image processing and intraocular elements).

Intellectual Property Status

US Provisional Patent No. 60/771435, filed February 2006 by Leznoff et al.

- **Stage of Development** Proof of concept demonstrated with $\text{Pb}[\text{Au}(\text{CN})_2]_2(\text{H}_2\text{O})$ (birefringence 0.07);¹
- Exploring other metals and ligands to optimize birefringence (0.4 achieved).

Partnering Opportunity

Available for co-development or licensing (exclusive or non-exclusive) by jurisdiction and/or field of use.

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References

¹Katz, M.J.; Aguiar, P.M.; Batchelor, R.J.; Bokov, A.A.; Ye, Z.-G.; Kroeker, S. and Leznoff, D.B. "Structure and Multinuclear Solid-State NMR of a Highly Birefringent Lead Gold Cyanide Coordination Polymer" J. Am. Chem. Soc., 2006 Mar 22;128(11):3669-76.