



Magnetically Tunable Photonic Crystals Based On Anisotropic Nanostructures

Tech ID: 32621 / UC Case 2015-756-0

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	10,796,849	10/06/2020	2015-756

FULL DESCRIPTION

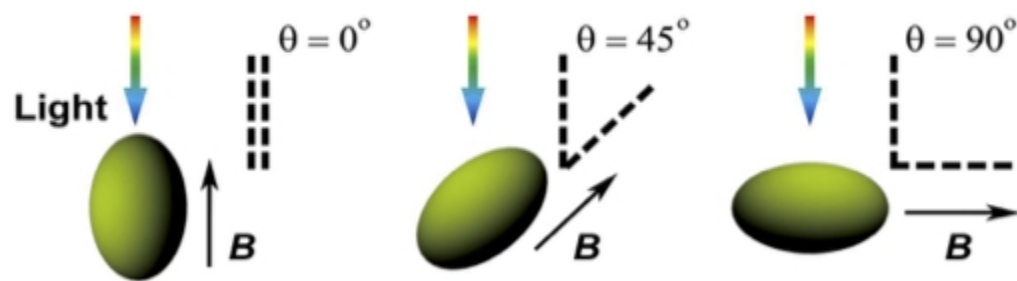
Background

Structural color is brilliantly iridescent, metallic and free from photo-bleaching like conventional pigments or dyes. Examples of this are witnessed in opals, bird feathers and butterfly scales. To mimic the formation of opals, most colloidal assembly processes create close packed structures from monodispersed colloidal spheres. However, living systems often involve non close packed ordered assemblies of anisotropic motifs, thus displaying more complex structural color responses including strong angular dependence and polarization effect.

Owing to the unavailability of high-quality anisotropic building blocks and the lack of an effective mechanism for assembly and tuning, efforts in fabrication of field responsive colloidal photonic structures have been limited. Anisotropic particles have shape dependent physical and chemical properties which adds more degrees of freedom for manipulation of the collective properties of the resultant superstructures.

Current Invention

The research team led by Prof. Yadong Yin have successfully synthesized well-defined ellipsoidal colloidal particles with anisotropy in both morphology and magnetic properties. The team has demonstrated the assembly of these ellipsoidal particles into three dimensional ordered structures with unique tunable photonic properties.



Schematic representation of the spontaneous alignment of nanoellipsoids under magnetic fields.

CONTACT

Venkata S. Krishnamurty
venkata.krishnamurty@ucr.edu
 tel: .

OTHER INFORMATION

KEYWORDS

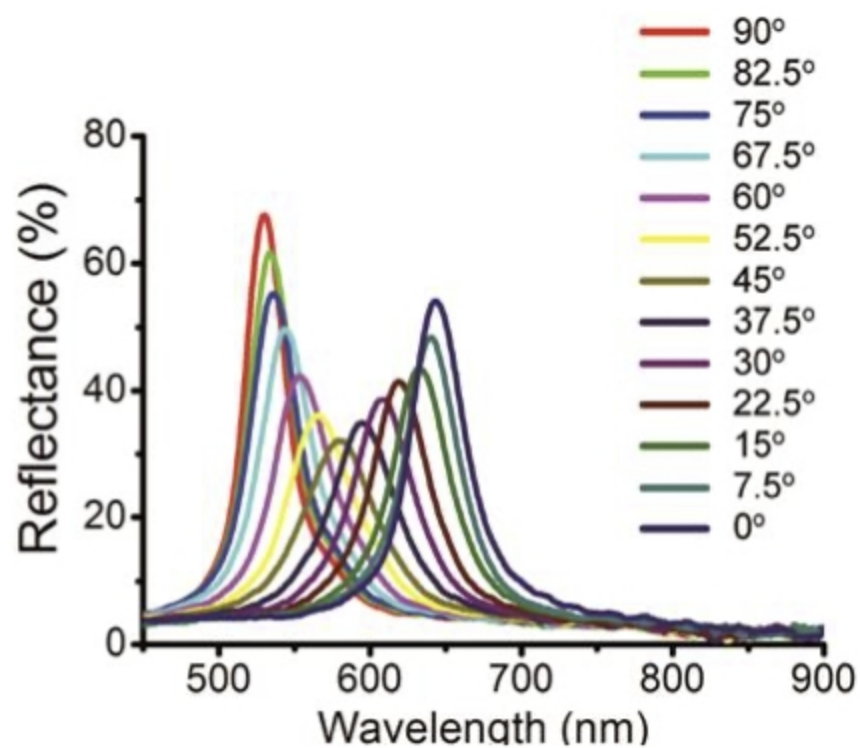
Anisotropic nanomaterials, photonic structures, structural color, pigments and dyes, adaptive camouflage, optical switches, anti-reflective, low reflectance coating

CATEGORIZED AS

- ▶ **Optics and Photonics**
 - ▶ All Optics and Photonics
- ▶ **Materials & Chemicals**
 - ▶ Nanomaterials
 - ▶ Polymers
 - ▶ Textiles
- ▶ **Nanotechnology**
 - ▶ Materials
 - ▶ Other
- ▶ **Transportation**
 - ▶ Automotive

RELATED CASES

2015-756-0



Reflection spectra of photonic structures under magnetic fields with varying direction with respect to the direction of light.

ADVANTAGES

The novel aspects of their invention are:

- ▶ The diffraction properties of the structure are strongly dependent on the field direction.
- ▶ A wide range of tuning in the diffraction spectrum can be achieved.
- ▶ Instantaneous tuning and fully reversible diffraction properties.
- ▶ Aid the creation of photonic patterns under magnetic fields with non-uniform field directions.

SUGGESTED USES

- ▶ Structural colors for presentation and displays
- ▶ Pigments, dyes and adaptive camouflage fabrics
- ▶ Optical switches
- ▶ Anti-reflective or low reflective surfaces

RELATED MATERIALS

- ▶ [Magnetic Assembly and Field Tuning of Ellipsoidal Nanoparticle Based Colloidal Photonic Crystals](#)

University of California, Riverside

Office of Technology Commercialization

200 University Office Building,

Riverside, CA 92521

otc@ucr.edu

research.ucr.edu/