



# Magnetically Tunable Photonic Crystals In Nonpolar Solvents

Tech ID: 32609 / UC Case 2009-502-0

## PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	9,862,831	01/09/2018	2009-502

## FULL DESCRIPTION

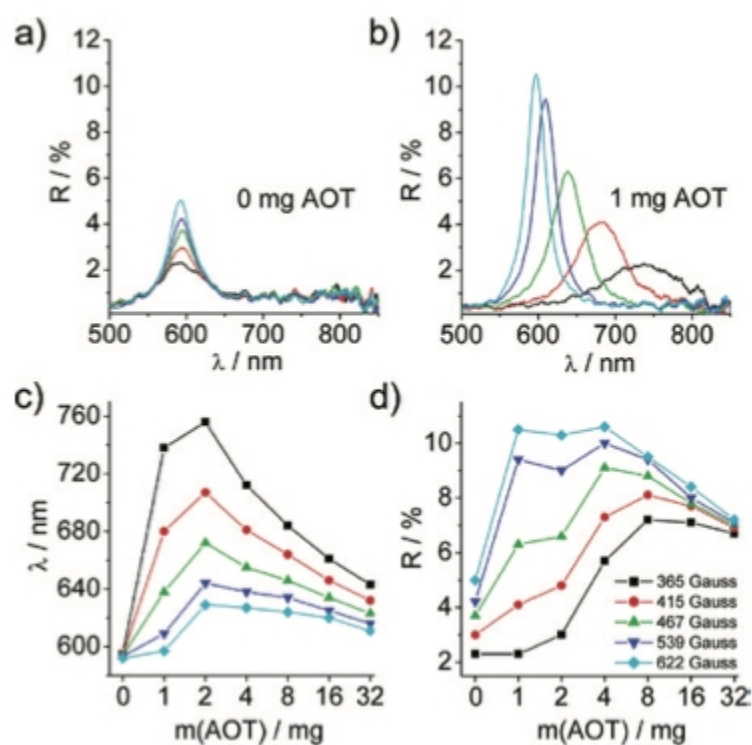
### Background

Field-responsive photonic structures have important applications in areas such as color display units, biological and chemical sensors, and active optical components. The key to a successful assembly and large tunability in photonic property is establishing long-range repulsive and attractive interactions that can cooperate to order the particles into periodic structures.

Practical applications often require the use of nonaqueous solvents to achieve long-term stability and improved compatibility with device fabrication processes.

### Current Invention

Inventors at UCR have been able to successfully achieve the large tunability in photonic property. By introducing charge control agents (AOT) in nonpolar solvents to reduce the energy barrier of charge separation, and thus creating long-range electrostatic repulsive interactions that can counteract the magnetic attraction to allow ordering of superparamagnetic colloids.



(a, b) Reflection spectra of a 1.5 mL DCB solution containing 167-nm (103/32-nm) Fe<sub>3</sub>O<sub>4</sub>@SiO<sub>2</sub> particles and (a) 0 mg and (b) 1 mg of AOT in response to an external magnetic field with varying strengths, respectively. (c, d) Dependence of (c) diffraction wavelength and (d) intensity upon the AOT concentration in magnetic fields with five different strengths.

## CONTACT

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## OTHER INFORMATION

### KEYWORDS

Colloidal crystals, Displays, Inks, Biosensors, Chemical sensors, Color displays, Active optical components

### CATEGORIZED AS

- ▶ **Optics and Photonics**
  - ▶ All Optics and Photonics
- ▶ **Biotechnology**
  - ▶ Other
- ▶ **Materials & Chemicals**
  - ▶ Biological
  - ▶ Chemicals
  - ▶ Nanomaterials
- ▶ **Medical**
  - ▶ Diagnostics
  - ▶ Research Tools
- ▶ **Nanotechnology**
  - ▶ Materials
  - ▶ NanoBio
- ▶ **Sensors & Instrumentation**
  - ▶ Biosensors
  - ▶ Scientific/Research

### RELATED CASES

2009-502-0

## ADVANTAGES

- ▶ Fast and fully reversible optical response to external magnetic field
- ▶ Long term stability in performance
- ▶ Good diffraction intensity

## SUGGESTED USES

- ▶ Color display devices
- ▶ Bio and Chemical sensors
- ▶ Active optical components
- ▶ Optical method for scientific research

## RELATED MATERIALS

- ▶ [Assembly of Magnetically Tunable Photonic Crystals in Nonpolar Solvents](#)

## INVENTIONS BY PROF. YADONG YIN

Please see the [portfolio of inventions by Prof. Yadong Yin at UCR](#).

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