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### Research Interests

A chiral molecule is a type of molecule that has a non-superposable mirror image. Molecular chirality is of interest because of its application to stereochemistry in inorganic chemistry, organic chemistry, physical chemistry, biochemistry, polymers, and supramolecular chemistry. In our lab, we focus our attention on the synthesis, characterization, and application of polymers. Following topics are currently carried out.

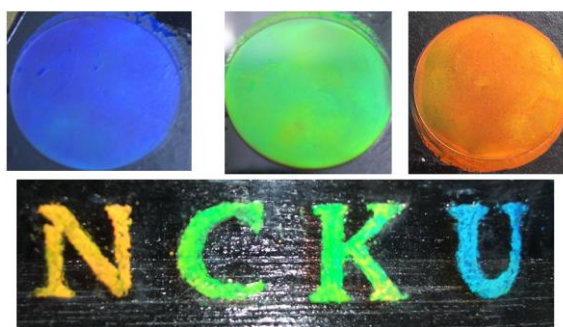
1. Liquid Crystalline Polymers: Synthesis and characterization of chiral nematic and smectic materials are research interests. Optical behaviors of the synthesized cholesteric liquid crystals are key research works.
2. Supramolecules: Synthesis and characterization of self-assembly of molecules are research interests. Gelation effect on the

optical properties of the synthesized gels and constructions are investigated.

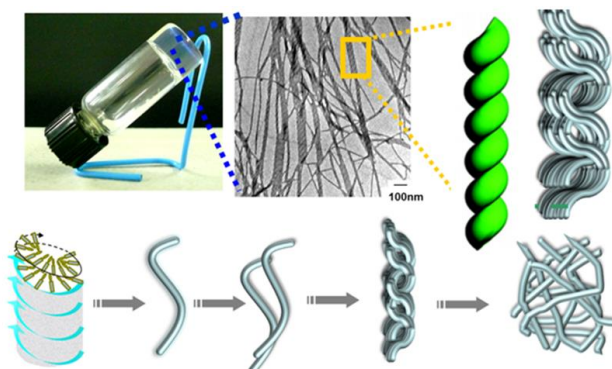
3. Chemosensors: Synthesis and characterization of chemosensors are performing. Selectivity, sensitivity, and applications are research key points.

### Representative Publications

1. JH Liu, YH Chiu, TH Chiu\*, 2009, Fabrication and Characterization of Self-assembled  $\beta$ -Cyclodextrin Threaded Monomers and Induced Helical Polymers, *Macromolecules*, 42 (11), 3715-3720.
2. R. Balamurugan, CC Chien, KM Wu, YH Chiu and JH Liu\*, 2013, Depropargylation-triggered fluorescence "turn on" probe for the detection of  $\text{Pd}^{2+}$  based on a bispropargyl-amine-rhodamine conjugate, *Analyst*, 2013, 138 (5), 1564 - 1569.



Reflection colors of a synthesized liquid crystalline film at different temperatures. Variation of pitches leads to the change of colors.



Self-assembly of molecules forms helical structures. Local chirality induced asymmetric constructions were observed using TEM.

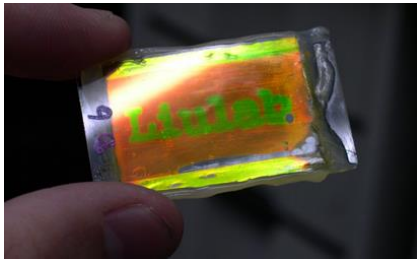
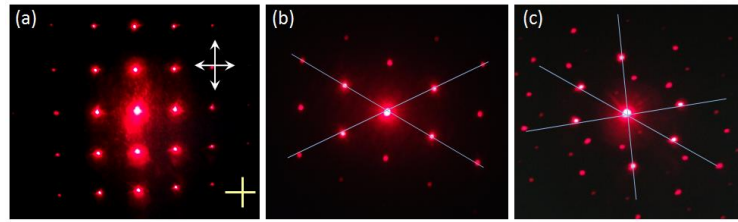


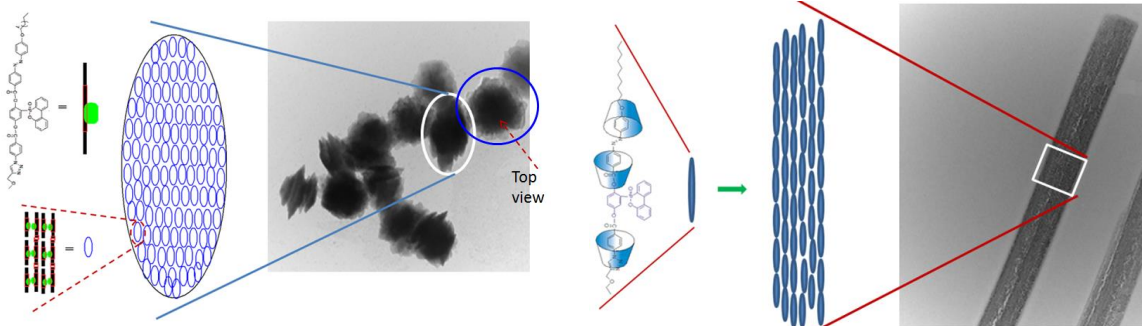
Image recording through a mask with "Liulab".



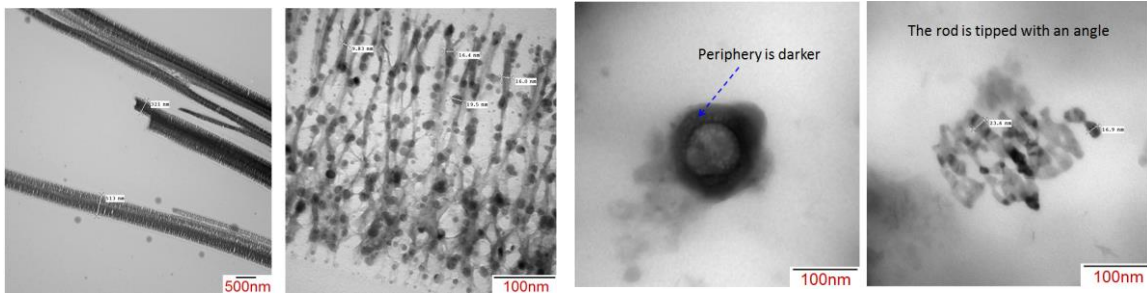
Diffraction images reconstructed by a He-Ne laser. 1D, 2D and 3D patterns were observed.



Liquid crystals can be used for LC display. Voltage bias changes LCD from "OFF" state to "ON" state. The response time could be really fast.

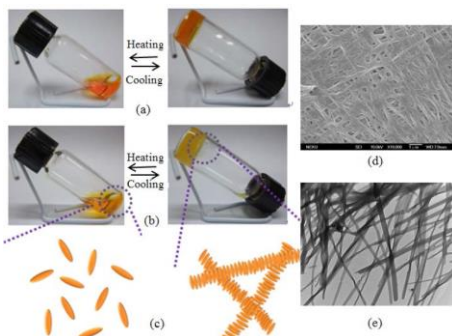


Self-assembly of highly conjugated compounds forms foot-ball like construction due to lateral forces. Threading of cyclodextrin (CD) further strengthen the interaction leading to the formation of fibers.

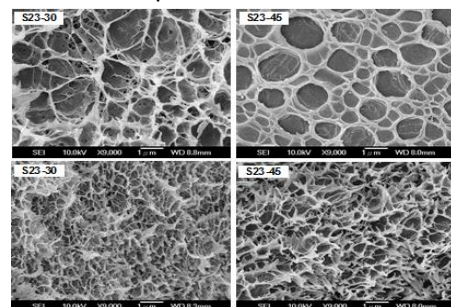


TEM images of self-assembled helical structures induced in chiral environment.

TEM images of sliced cross section of the self-assembled samples.



Sol-gel transition via UV-irradiation and thermal stimulus.



Fabrication of porous-cells used as micro reactor for the reduction of metal ions.