

## **Plasmonic Photopatterning of Molecular Orientations: an Enabling Technique for New Soft Matter and Devices**

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**Seminar on Thursday, February 23, 2017 at 11:00 am in 2004 Black**  
**Seminar host: Jaime Juárez**

### **Abstract**

Liquid crystals (LCs) as characterized by orientational ordering of their constituent molecules are an extraordinary class of soft matter as they exhibit simultaneously the anisotropic physical properties of solids and the large responsiveness of liquids, a feature useful for many applications including the LCD that has changed our daily life. Many emerging applications of LCs rely on spatially non-uniform molecular orientations, while no existing technique can achieve that in a scalable fashion. In this talk, I will present a new projection photopatterning technique that allows for aligning molecular orientations into complex 2D and 3D patterns by using engineered plasmonic metamasks (PMMs). In contrast to traditional photomasks where only light intensity patterns are generated and used, the PMMs generate spatially varying patterns of both light intensity and polarization. By projecting light transmitted through the PMMs on to photoactive materials such as azo-dyes, complex molecular orientation patterns encoded in the PMMs can be imposed in the photoactive materials and then transferred into bulk liquid crystals. This mask-based technique features high throughput, high repeatability, low cost and scalability for large volume liquid crystal device manufacturing. I will highlight a few emerging applications enabled by this technique, including controlled colloidal assembly, microfluidics, commanding active matter, and programmable origami.

### **Bio**

Dr. **Qi-Huo Wei** is currently an associate professor in the Liquid Crystal Institute, and Department of Chemical Physics at Kent State University. He received his PhD in Physics from Nanjing University in China. Before joining Kent State University, he was research scientist at the Biodesign Institute in Arizona State University and research engineer at University of California in Los Angeles. He was an Alexander von Humboldt Research fellow in 1996-1999 and a recipient of the NSF CAREER award in 2010. The research of his group at the Liquid Crystal Institute is multidisciplinary, covering soft and active matter, plasmonic nanophotonics, micro/manufacturing.

***This seminar counts towards the ME 600 seminar requirement for Mechanical Engineering graduate students.***