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Manipulating liquid crystals via photo generated fields and tailored polymer

Liquid crystals (LCs) are well-known for their highly sensitive and tuneable optical properties. However, inorganic-organic hybrids with localized, light induced (opto-optical) responses and LC composites with fast or threshold-free switching are sought after. In addition to conventional modulation of the intensity, the main goal is to tune optical phase shifts of incident light waves. Localized optical responses can be triggered by the use of light, to allow for optical manipulation. Photo generated polymer can yield in highly responsive, fast LC composites for future displays and adaptive optics.

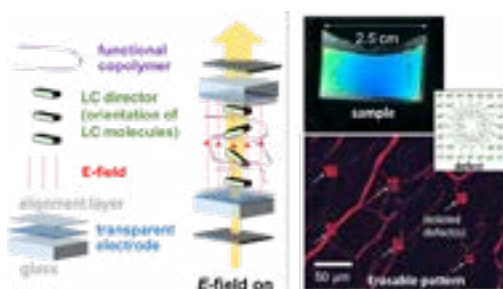


Figure 1: Schematic of a polymer network LC sample and polarized optical micrographs of a hybridized sample with photoinduced, erasable defect pattern.

Recent Publications:

1. Habibpournmoghadam A et al. (2017) Laser-induced erasable patterns in a N* liquid crystal on an iron doped lithium niobate surface. *Optics Express* 25(21):26148-26159.
2. Habibpournmoghadam A et al. (2017) Optical manipulation and defect creation in a liquid crystal on a photo responsive surface. *Physical Review E* 96(2-1):022701. Doi:10.1103/PhysRevE.96.022701.
3. Lorenz A et al. (2017) Nematic copolymer network LCs for swift continuous phase modulation and opaque scattering states. *Mol. Cryst. and Liq. Cryst.* 646(1):220-225. Doi:10.1080/15421406.2017.1288001.
4. Lorenz A, Braun L and Kolosova V (2016) Continuous optical phase modulation in a copolymer network nematic liquid crystal. *ACS Photonics* 3(7):1188-1193. Doi:10.1021/acsp Photonics.6b0072.

Biography

Alexander Lorenz graduated from the Centre of Optoelectronics and Photonics Paderborn (Germany) in 2010 and has since conducted research at other leading institutions. He is the research Group Leader in the Department of Chemistry at the Paderborn University, Germany. His present research interests are photo generated polymer-liquid crystal hybrids and inorganic-organic liquid crystal hybrids with high responsiveness and fast performance. He has completed Deutsche Forschungsgemeinschaft (DFG)- (a German research funding organization) -Research Fellowships in the Department of Engineering of the University of Cambridge UK and TU Berlin; led research projects funded by TU Berlin, DFG, and the US Air Force Office of Scientific research at TU Berlin and Paderborn University, and has (since 2017) acted as temporary replacement to fill the Full Chair Professorship for macromolecular chemistry and molecular materials at the Institute of Chemistry of the University of Kassel, Germany.

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