Max-Planck-Institut für Struktur und Dynamik der Materie

Max Planck Institute for the Structure and Dynamics of Matter

April 27, 2016 – 10:00 h a.m.
CFEL Seminar room IV, O1.111 (Bldg. 99)

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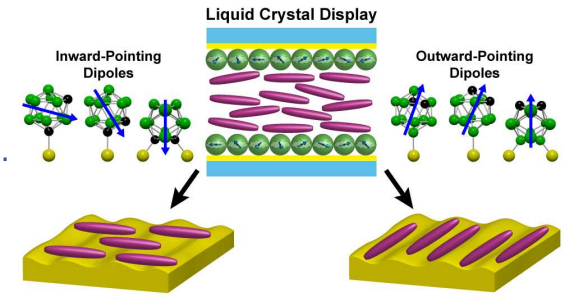
What's on The Outside Counts Too: Surface-Dipole Modulated Assembly

Detailed understanding and control of the intermolecular forces that govern molecular assembly are necessary to engineer structure and function at the nanoscale.

Liquid crystal (LC) assembly is exceptionally sensitive to surface properties, capable of transducing nanoscale intermolecular interactions into a macroscopic optical readout. Self-assembled monolayers (SAMs) modify surface interactions and are known to influence LC alignment. Here, we exploit the different dipole magnitudes and orientations of carboranethiol and dithiol positional isomers to deconvolve the influence of SAM-LC dipolar coupling from variations in molecular geometry, tilt, and order. Director orientations and anchoring energies are measured for LC cells employing various carboranethiol and dithiol isomer alignment layers. The normal component of the molecular dipole in the SAM, toward or away from the underlying substrate, was found to determine the in-plane LC director orientation relative to the anisotropy axis of the surface. By using LC alignment as a probe of interaction strength, we elucidate the role of dipolar coupling of molecular monolayers to their environment in determining molecular orientations.

We apply this understanding to advance the engineering of molecular interactions at the nanoscale



Host: Sebastian Loth

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