Title:	Distinct interfacial ordering of liquid crystals observed by protein–lipid interactions that enabled the label-free sensing of cytoplasmic protein at the liquid crystal-aqueous interface
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Abstract:	Interfaces formed between a lipid decorated liquid crystal (LC) film and an aqueous phase can mimic the bimolecular membrane where interfacially occurring biological phenomena (e.g., lipid–protein interactions, protein adsorption) can be visually monitored by observing the surface-sensitive orientations of LCs. The ordering behavior of LCs at different phospholipid-based LC interfaces (1,2-dilauroyl-sn-glycero-3-phosphocholine (DLPC) and lysophosphatidic acid (LPA)) were investigated to determine the sensing of an important cytoplasmic protein (juxtamembrane of epidermal growth factor receptor (JM-EGFR)). At both DLPC and LPA decorated interfaces, the LC adopts homeotropic ordering, causing a dark optical appearance under crossed polarizers. Interestingly, upon the introduction of JM-EGFR to these LC-aqueous interfaces, the homeotropic orientation of the LC changed to planar (bright optical appearance), suggesting the potential of the designed system for JM-EGFR sensing. The use of different lipid decorated LC-aqueous interfaces results in the emergence of distinct optical patterns. For example, at a DLPC laden interface, elongated bright domains are observed, whereas a uniform bright texture is observed on an LPA laden interface. The DLPC decorated LC-aqueous interface is found to be highly selective for the sensing of JM-EGFR with a detection limit in the nanomolar concentration region (~ 50 nM). When compared to spectroscopic and other conventional techniques, the LC-based design is simpler, and it allows the simple and label-free optical sensing of JM-EGFR at fluidic interfaces.
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