Title:	DESIGN OF AQUEOUS-LIQUID CRYSTAL INTERFACES FOR BIOSENSING APPLICATIONS
Authors:	Verma, I. (/jspui/browse?type=author&value=Verma%2C+I.)
Keywords:	Liquid Crystal Biosensors Cyclic Lipopeptides at Aqueous Interfaces Liquid Crystal Based Detection of Pb (II) ions Detection of Creatinine
Issue Date:	Sep-2019
Publisher:	IISER Mohali
Abstract:	Interfaces formed between liquid crystals (LCs) and aqueous phases decorated with biomolecules have revealed the orientational ordering of LCs to be strongly coupled to the organization of assemblies of biomolecules at those interfaces. This phenomenon is providing the basis of facile approaches to the realization of new classes of sensors. In particular, interfacial events occurring at aqueous-LC interfaces involving biomolecules can lead to surface-driven ordering transitions of the LCs (providing an optical output), which can be performed under ambient light without the need of electrical power. This presentation will describe four examples to design LC-based stimuli-responsive interfaces at aqueous phase that can detect important bio- and small molecules. The first example will address the influence of nanoscale organization of cyclic lipopeptides on the ordering of LCs. The study demonstrates the potential application of peptide-decorated aqueous-LC interfaces in label free imaging of amyloidogenic proteins.1,2 Second example will unmask a new strategy for label-free detection of toxic metal ions such as lead (II) in aqueous media based on aptamer metal ion binding events. Such systems form the basis of new soft materials that permit LC ordering to propagate from the macroscale to the optical scale with remarkable sensitivity.3 Third example4 will describe a simple design of a pH-responsive LC sensor for detection of creatinine, an important renal marker, utilizing enzymatic pathway. In the fourth approach, use of elastic strain within LC droplets to create dynamic templates is explored for detection of proteins and DNA.5-7 Using poly-L-lysine (PLL) coated LC emulsion droplets to monitor the real-time imaging of proteins (bovine serum albumin, concanavalin A, cathepsin D) at droplet interfaces will be illustrated. Additional observations regarding the dynamic behaviours of PLL-LC droplets in understanding the conformational changes of fibronectin will be discussed. Fundamental challenges and technological opportunities will be highlighted in each of these examples.
URI:	http://hdl.handle.net/123456789/1589 (http://hdl.handle.net/123456789/1589)

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