Title:	Dynamic Ordering Transitions of Liquid Crystals at Biomolecular Interfaces
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Abstract:	Dynamic Ordering Transitions of Liquid Crystals at Biomolecular Interfaces Liquid crystals (LCs) when confined in constrained geometries surrounded by an aqueous medium, offer promise as responsive interfaces for bimolecular recognition. The most interesting aspect of liquid crystalline interfaces is that the LC molecules allow the biomolecular events occurring at the interfaces to be amplified into easily measurable optical signals. In this presentation, the utility of thermotropic nematic LC will be discussed for 5 distinct applications. Each of the five examples highlight a specific fundamental challenge and how the interfacial properties of LC can be utilized to address it. In the first example, thin films of LC have been demonstrated to report the lipopolysaccharide-induced aggregation of a bacterial functional amyloid at nanomolar concentrations. 1 The second example shows that these LC films can be used to study the membrane-induced aggregation of soluble oligomers of amyloid β peptide. 2 These studies show that LC can be used as a probe to monitor the aggregation of amyloidogenic peptides at biomolecular interfaces in the physiologically relevant nanomolar concentration regime. 1,2 The third example deals with probing the nanoscale interactions that drive the ordering transitions of LC resulting in exotic internal configurations of LC microdroplets in response to the interfacial lipid-protein interactions. 3 This provides unique insights into the origins of the biomolecular interactions which might be useful in the design of LC-based sensors for the detection of protein biomarkers. The fourth example unmasks the potential of LCs as vehicles for encapsulation and enzyme-triggered release of hydrophobic drug molecules. 4 The fifth example uncovers the delicate interplay between LC anchoring and colloid positioning at the surfaces of spherically confined LCs. The positioning of colloids at LC interfaces present interesting opportunities in the design of optically responsive elastomers and functional colloidal materials. The five distinct applications of LC are unified by the challenge of understanding the self-assembly of LC molecules at biomolecular interfaces which is integral to the design of LC-based biochemical sensors. 1 J. Phys. Chem. C 2019,123,1305-1312; 2 J. Phys. Chem. Lett. 2020, 11, 9012-9018; 3 Nano Lett. 2021, 21, 4546-4553; 4 J. Mater. Chem. B 2022, 10, 3032-3038
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