Title:	Protein triggered ordering transitions in poly (L-lysine)-coated liquid crystal emulsion droplets
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Abstract:	Here, we report a simple and label-free methodology for real-time monitoring of adsorption of proteins such as bovine serum albumin (BSA), concanavalin A (ConA) (a lectin) and cathepsin D (CathD) (a tumour marker) on micrometer-sized poly (L-lysine) (PLL) functionalised liquid crystal (LC) droplets dispersed in aqueous phases. Earlier, we had demonstrated that PLL, a positively charged natural peptide, can induce homeotropic ordering of LCs at LC-aqueous interface, and thus PLL-adsorbed LC droplets showed radial director configuration. Herein, it was observed that subsequent non-specific adsorption of anionic proteins such as BSA, ConA and CathD can trigger a quick transition in director configuration of PLL-LC droplets (primarily dominated by electrostatic interactions) to pre-radial or bipolar, thus acting as a simple optical probe for detection of these proteins up to μg/mL of concentrations. Further, the detection limits for these proteins are found to vary (BSA<ConA<CathD) which follow the similar order as their anionic charges, thus suggesting the role of different binding affinities of protein-PLL in realising the director configuration of LC droplets. Overall, this study offers new pathways utilising ordering transition in LC droplets which will strengthen the principles to recognise biomolecular interactions for various interfacial and sensing applications.
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