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Influence of salt on oppositely charged Polyelectrolyte/Surfactant mixtures: A comparing neutron reflectometry and surface tension study

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The surface properties of oppositely charged polyelectrolyte/surfactant mixtures play an important role in colloidal dispersions (foams, emulsions) e.g. for cosmetics, cleaning products and in food technology.

Extensive research on such mixtures was already performed with the focus on different polyelectrolytes as well as surfactants. However, the influence of the ionic strength is still unclear.

This work focuses on the influence of added salt (NaBr or LiBr depending on the polyelectrolyte counterion) on the adsorption behaviour of mixtures of the anionic polyelectrolyte NaPSS or sPSO₂-220 with the cationic C₁₄TAB. Therefore, surface tension and neutron reflectometry (NR) measurements were performed with a fixed C₁₄TAB concentration and a variable polyelectrolyte concentration at different salt concentrations (10⁻⁴, 10⁻³, 10⁻² M).

For NaPSS, NaBr reduces the surface tension over the whole studied polyelectrolyte concentration range (10⁻⁵ – 10⁻³ monoM) and broadens the seen increase of surface tension at the bulk stoichiometric mixing point (BSMP). The surface excess of both components –detected by neutron reflectometry –correlates quite well with these finding. In contrast, LiBr reduces the surface tension of sPSO₂-220 only above the BSMP. Here, the finding of NR are not matching the surface tension results. Possible reason such as structural differences of the polyelectrolytes or sensitivity of measurements will be discussed.

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