

# STRUCTURAL TRANSITIONS OF HYBRID MICELLES OF IONIC SURFACTANT WITH EMBEDDED HYDROPHOBIC POLYMER INDUCED BY SALT AND HYDROCARBON

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During the last decades, there is an enhanced interest for applying surfactants together with polymers in many industrial areas. Particularly, in oil recovery semidilute solutions of both polymers and surfactants are used as thickeners in hydraulic fracturing fluids. Polymer/surfactant complexes in aqueous medium, also called hybrid micelles, yield a variety of objects with form and structure governed by the environment. Rheological experiments demonstrate, that viscoelastic properties of the solutions of hybrid micelles are sufficiently sensitive to such conditions as salinity and presence of hydrophobic species. Therefore small-angle neutron scattering (SANS) and X-ray scattering (SAXS) are essential experimental techniques to provide the data on the form and structural transitions of hybrid micelles induced by addition of inorganic salt and hydrocarbon. Furthermore, contrast variation in SANS allows to obtain the scattering profiles separately from polymer and surfactant molecules in hybrid complexes.

The present study is devoted to the influence of KCl and decane concentrations on the hybrid micelles of anionic surfactant potassium oleate with embedded hydrophobic polymer poly(4-vinylpyridine). Several complimentary experimental methods, including cryo-transmission electron microscopy, 2D NMR, dynamic-light scattering and florescent spectroscopy, beyond SANS and SAXS, were applied to represent the transition from beads-on-string complexes to wormlike hybrid micelles induced by salt and vice versa upon solubilization of hydrocarbon.

The SANS and SAXS experiments were carried out at the Frank Laboratory of Neutron Physics (Joint Institute for Nuclear Research, Dubna, Russia). The SANS measurements were performed with the YuMO instrument at the high-flux pulsed reactor IBR-2. Xeuss 3.0 SAXS/WAXS System was used for SAXS.

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