Revealing the formation and stability of fluorescently-labeled poly(ethylene imine) monolayers on mica via DLS and electrokinetic methods

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Rhodamine B-labeled poly(ethylene imine) (PEIR) was synthesized and characterized using UV-Vis spectroscopy, dynamic light scattering (DLS) and LDV electrophoresis. DLS measurements indicated that PEIR had a constant hydrodynamic diameter of 8.3 nm at an ionic strength of 10^{-2} M over a range of solution pH [1]. Electrophoretic studies confirmed that PEIR is positively charged from pH 3.0 to pH 10.6 [1]. The formation and stability of PEIR monolayers on a highly anionic planar mica surface were studied *in situ* using streaming potential measurements. These data were quantitatively interpreted in terms of an electrokinetic model assuming a three-dimensional charge distribution near the mica surface induced by adsorbed PEIR chains. Calibration data enabled the desorption kinetics and stability of PEIR monolayers to be investigated. PEIR desorption in the presence of 10^{-2} M salt at pH 5.8 remained modest within 24 h [1]. Moreover, the acid-base properties of a PEIR monolayer deposited on mica was determined via streaming potential measurements over a broad pH range [1]. Deposition of well-defined adsorbed layers of PEIR onto planar substrates such as mica can be utilized to assess the kinetics of bindings of various ligands. The change in zeta potential for PEIR as a function of pH in bulk solution was determined and an applied correction function allowed the zeta potential of PEIR-coated mica to be calculated over the pH range 3.5-10 [1]. It was confirmed that streaming potential measurements of PEIR monolayers deposited on mica proved to be more informative compared to bulk solution studies over this pH range.

Acknowledgements The financial support of the Grant POIG. 01.01.02.-12-028/09

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