

PROBING THE SURFACE OF POLYMER COLLOIDS BY CONDUCTOMETRIC SURFACTANT TITRATION

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Abstract

The modification and the control of the morphology of polymer colloids is of growing interest in the development of new aqueous latices for coating applications. Design of suitable particle morphologies can lead to otherwise inaccessible material properties such as the combination of specific film formation and mechanical characteristics.

Aside of the polymer structure and its chemical composition, the particle structure needs also to be characterised in order to establish structure-property relationships. The latter data usually lack as they are hard to obtain. Recent studies show that internal morphological details of dispersed polymer particles can be obtained by a combination of selected and advanced techniques including solid-state NMR and transmission electron microscopy.

In this communication we focus on the quantitative characterisation of the particle surface by surfactant titration. Although surfactant adsorption is a well-known approach for the examination of colloidal polymer surfaces, the originality here rests in the use of conductivity monitoring to follow the titration continuously. The amount of a probe surfactant (i.e. sodium dodecyl sulphate) required to saturate a latex, combined with the knowledge of the critical micelle concentration in water, the particle size and the solid content allows the determination of the value of the saturation adsorption area of the polymer particle which is related to its surface composition. The application and the reproducibility of the method is illustrated with results obtained from a round-robin testing program on acrylate and acrylate-styrene latices prepared in single and multiple stages.

Keywords: Polymer colloid, surfactant titration, adsorption area, particle morphology