TOPICAL REVIEW

Theory of electrostatics and electrokinetics of soft particles

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Abstract. We investigate theoretically the electrostatics and electrokinetics of a soft particle, i.e. a hard particle covered with an ion-penetrable surface layer of polyelectrolytes. The electric properties of soft particles in an electrolyte solution, which differ from those of hard particles, are essentially determined by the Donnan potential in the surface layer. In particular, the Donnan potential plays an essential role in the electrostatics and electrokinetics of soft particles. Furthermore, the concept of zeta potential, which is important in the electrokinetics of hard particles, loses its physical meaning in the electrokinetics of soft particles. In this review, we discuss the potential distribution around a soft particle, the electrostatic interaction between two soft particles, and the motion of a soft particle in an electric field.

Keywords: soft particle, Donnan potential, electrostatic interaction, electrophoretic mobility

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