



FIG. 1.2 Schematic drawing of the potential drop at the double layer. (Adapted from reference Besra, L., Liu, M., 2007. A review on fundamentals and applications of electrophoretic deposition (EPD). *Prog. Mater. Sci.* 52, 1–61, reproduced with permission of Elsevier.)

The ions that are responsible for the surface charge are the potential-determining ions. Opposite-charged ions (mainly hydrated counterions) are attracted to the particle surface, repelling co-ions.

This leads to the formation of the electrical double layer. The layer of counterions close to the particle surface is called the Stern layer, which is followed by a diffuse double layer or lysosphere (see Fig. 1.2). The potential difference between both layers is called the zeta potential (ξ).

The zeta potential determines the velocity (v) by which a particle is moved under the influence of an electric field (E) by the electrophoretic mobility (μ) (Fagerlund, 2017) via the Henry equation (1):

$$\mu = \frac{2}{3} \frac{\epsilon_0 \epsilon_r \xi}{\eta} f(\kappa_r) \quad (1)$$

$$\mu = \frac{v}{E} \quad (2)$$

where ϵ_0 is the permittivity of vacuum, ϵ_r the relative permittivity of the solvent, η the viscosity of the solvent, and $f(\kappa_r)$ the Henry coefficient. Besides the surface charge and the related suspension stability, the zeta potential determines