the direction and velocity of the suspended particles. In order to avoid particle agglomeration, a high electrostatic repulsion is needed (meaning a high zeta potential). If the surface charge is too high the particles repulse each other during deposition, leading to a high particle packing density (Besra and Liu, 2007). The zeta potential is strongly pH dependent and can be adjusted by, for example, acids, bases, or specifically adsorbed ions. At low pH values, the zeta potential exhibits a positive value (positive surface charge). At high pH values, the overall surface charge is negative while at the isoelectric point (IEP) the zeta potential is zero. At this point, the particle does not move under the influence of an electric field, the suspension is instable and will sediment rapidly. The IEP is different for every particle-electrolyte combination and can occur at very high or very low pH (Besra and Liu, 2007).

Another important factor influencing EPD is the suspension stability. According to the DLVO (Derjaguin, Landau, Verwey, and Overbeek) theory (Zhitomirsky, 2002), the force on colloidal particles consists of coulombic double-layer repulsion and van der Waals' attraction. The total energy of both forces gives the energy barrier to particle coagulation. If the repulsion is low compared to the attractive forces, the energy barrier decreases and flocculation occurs (Zhitomirsky, 2002).

There are several mechanisms proposed for explaining deposition in the EPD process. The first model was proposed by Hamaker et al. in 1940 (Hamaker, 1940). A linear variation of mass with time was proposed: $\frac{dY}{dt} = f \cdot \mu \cdot C_s \cdot E \cdot A$, where Y is the deposition yield, C_s is the suspension concentration, μ is the electrophoretic mobility, A is the deposition area, E is electric field, and f is an efficiency factor, which considers that not all particles reaching the electrode are deposited. Deposition occurs through sedimentation of particles and the subsequent exerted pressure by incoming particles (Hamaker, 1940). This model requires uncharged particles and can therefore only be used for short deposition times (Ferrari and Moreno, 2010).

To overcome this drawback of the early Hamaker model, several approaches have been proposed. However, the most accepted one was developed by Sarkar and Nicholson (1996) They suggested the following formula:

$$\frac{dm}{dt} = f \cdot \mu \cdot S \cdot E \cdot C_s$$

where f is a sticking factor and can only be less or equal to 1. If $f = 1$, all particles reach the electrode and take part in the deposition (Sarkar and Nicholson, 1996). However, this formula assumes a constant concentration, which is not valid for longer deposition times. An overview of equations for deposition models can be found in the literature (Ferrari and Moreno, 2010).

The EPD process can be influenced by several parameters. According to Besra and Liu (2007) they can be divided into suspension-related and process-related parameters. The suspension-related parameters Include, for example, the zeta potential and the subsequent stability of suspension; but also the particle