size to be deposited, the dielectric constant, and the conductivity of the suspension are important parameters affecting the EPD process. Once the suspension parameters are fixed, the process parameter can be varied, for example, deposition time, applied voltage, and conductivity of the substrate material. During the initial deposition period, the deposition rate is linear. However, for longer times a plateau can be observed as the formed coating of ceramic particles is an insulating layer, decreasing the effective electric field (Besra and Liu, 2007; Basu et al., 2001).

For aqueous suspensions, the effect of water electrolysis on coating quality must be considered. The standard potential according to the Nernst equation at 25°C at pH 7 is −1.23 V. All applied voltages above this value will inevitably lead to water dissociation. During electrolysis, the reduction reaction $2H^{+}_{(aq)} + 2e^{-} \rightarrow H_{2\,(g)}$ occurs at the cathode, while the oxidation $2H_2O_{(l)} \rightarrow O_{2(g)} + 4H^{+}_{(aq)} + 4e^{-}$ occurs at the anode. The redox reaction results in a H_2 accumulation at the cathode and an O_2 accumulation at the anode (Mishra et al., 2010).

These gas bubbles can remain in the coating during deposition, resulting in undesired coating porosity. To reduce or avoid the gas generation, pulsed direct current or alternating current (AC) can be used (see Fig. 1.3).

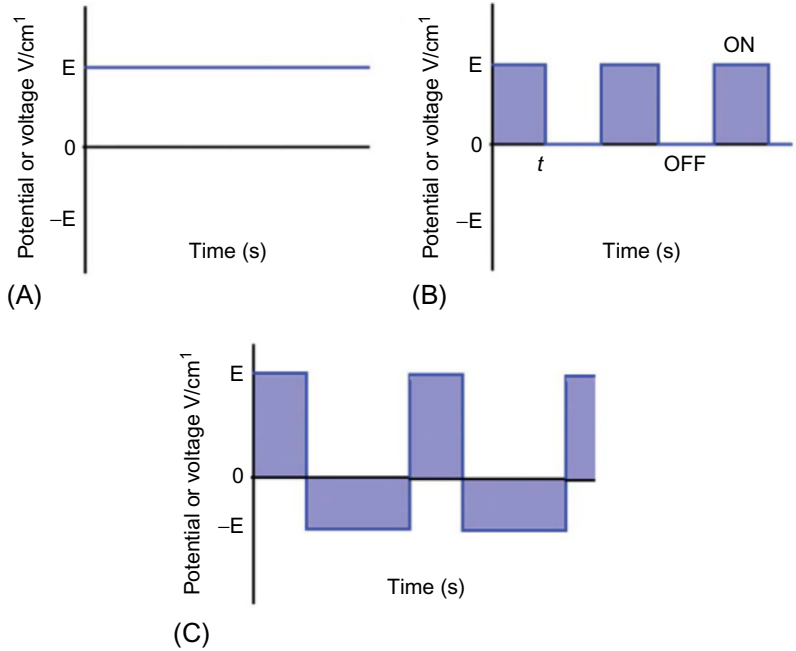

FIG. 1.3 Different signals for EPD; (A) constant direct current; (B) pulsed direct current; (C) asymetrical alternating current. *(Reproduced with permission from Ammam, M., 2012. Electrophoretic deposition under modulated electric fields: a review. RSC Adv. 2, 7633 of Royal Society of Chemistry.)*