AN OLD PROBLEM REVISITED: THE ELECTRIC CURRENT DURING CONSTANT VOLTAGE ELECTROPHORETIC DEPOSITION

Luc Vandeperre, Imperial College London. United Kingdom

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It is well known that during constant voltage electrophoretic deposition (EPD) from a non-aqueous ceramic slurry, the electric current through the cell decreases with time. The origin of this decrease in electric current is important as it affects the magnitude of the electric field over the suspension and hence the speed of the powder particles and the force on the particles for further deposition. As in every electrochemical cell, the drop in current could be due to the depletion of species capable of reacting at either electrode (concentration polarisation), the formation of the deposit itself whose electrical resistance can be different from that of the suspension and changes in the conductivity of the suspension. At the time EPD work started in earnest in Leuven, the middle of the 1990's, the dominant explanation in the literature was that it was the resistivity of the deposit which explained the changes in the electric current, while the results obtained in Leuven pointed more at a reduction in conductivity of the suspension as it became depleted of charge carrying powder particles as deposition continued. In this contribution, the original dispute will be reiterated together with the early evidence that the deposit only played a minor role in increasing the resistance. This will be followed by a review of the literature since then to ascertain in how far this question has now been resolved.