Electrophoretic mobility and Electronkinetics of Charged Particles on the Electrophoretic Display Performance

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Many research groups have devoted to develop the electronic ink materials and other related technologies, because of the various advantages of the electrophoretic display (EPD), which has good visibility under the sunlight ambience with paper-like appearance. Without a backlight, EPDs are able to be made thinner, lighter, and flexible. Moreover, because of the characteristic of bistability, EPDs retain the image after removing the driving voltage, which thus decreases the power consumption. Among all types of EPDs, the microcapsuled EPD has its advantages of low manufacturing cost using roll to roll process and high contrast ratio.

The optical contrast of the microencapsulated EPD containing an electronic ink, composed the oppositely charged pigment particles in dielectric fluid is varied by manipulating the migration of the particles. The charged particles are prepared with the hyrophobically coated pigments mixing with the dispersion agents in the non-polar medium. Upon applying an external field, the dispersion agent molecules dissociate into a pair of opposite charged species. And then, part of the micelles would interact with particles to make them charged.

The performance of the EPDs is strongly dependent on the stability of the charge shells, which avoid the flocculation between particles. The stability of pigment particles against aggregation in nonaqueous solvents has been the complex phenomena. While applying an external field, both the charged particles and charged micelles would contribute to the transient current in the electronic ink.

We will show how the transient current and electrophoretic mobility of EPDs and their pigments have an influence on the contrast ratio and optical response.