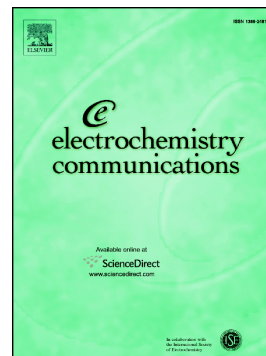


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Open circuit potential transients associated with single emulsion droplet collisions at an interface between two immiscible electrolyte solutions

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Abstract

Measurements of the open circuit potential (OCP) transients at a sessile aqueous electrolyte drop in contact with a 1,2-dichloroethane (DCE) electrolyte solution were used to detect the collisions of the single DCE-in-water emulsion droplets carrying 0.35 M tetradodecylammonium chloride with the interface between two immiscible electrolyte solutions (ITIES). Analysis of the OCP transients yielded the droplet size distribution, which is comparable with distributions obtained from the current transient measurements at a constant applied potential. These results are supported by the dynamic light scattering measurements and the microscope droplet image processing. Observed potential or current spikes appear to be associated with the single collisions of the emulsion droplets with the ITIES followed by the fast droplet ionic charge injection into the electric double layer at the ITIES possibly involving the transfer of Cl^- across the droplet/aqueous phase interface, and by the double layer relaxation.

Keywords: ITIES; OCP transient; Current transient; Emulsion droplet; Single collision; Droplet size distribution

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