

Abstract Submitted
for the DFD10 Meeting of
The American Physical Society

Translation and coalescence of freely floating droplets using electrophoresis¹ DONG WOOG LEE, DO JIN IM, IN SEOK KANG, POSTECH, CFD LAB TEAM — Aqueous droplets could be charged and transported between two DC electrodes in oil (Jung *et al.* J. Colloid Interface Sci. 2008). And in that situation, two oppositely charged droplets coalesce under mild electric field but they do not coalesce under high electric field (Ristenpart *et al.* Nature, 2009). In these previous experiments, the aqueous droplets were totally under oil. In present work, the aqueous droplets are floating on the heavy oil. The floating droplet system has several advantages comparing the submerged droplet system. First, the drag force on the moving droplet is lower than that of the submerged droplet. Second, post process could be simple, because the droplets are exist on the top of the system. Third, droplet coalescence is easy, because they are in same height. In this work, drag force and velocity field of the translating droplet are computed through numerical simulation. And the translating velocity and condition for coalescence of droplets are investigated through the experiments.

¹This work was supported by the grant R01-2009-0083830 from National Research Foundation (NRF) of Korea, and by the BK21 program of the Ministry of Education, Science and Technology (MEST) of Korea.

Dong Woog Lee
POSTECH

Date submitted: 03 Aug 2010

Electronic form version 1.4