Abstract Submitted
for the DFD11 Meeting of
The American Physical Society

Suppressing the coffee stain effect: how to control colloidal self-assembly in evaporating drops using electrowetting[1] BURAK ERAL, DILEEP MAMPALLIL AUGUSTINE, MICHEL DUITS, FRIEDER MUGELE, Physics of Complex Fluids Group, University of Twente, PHYSICS OF COMPLEX FLUIDS GROUP, UNIVERSITY OF TWENTE TEAM — We study the influence of electrowetting on the evaporative self-assembly and formation of undesired solute residues, so-called coffee stains, during the evaporation of a drop containing non-volatile solvents. Electrowetting is found to suppress coffee stains of both colloidal particles of various sizes and DNA solutions at alternating (AC) frequencies ranging from a few Hertz to a few tens of kHz. Two main effects are shown to contribute to the suppression: (i) the time-dependent electrostatic force prevents pinning of the three phase contact line and (ii) internal flow fields generated by AC electrowetting counteract the evaporation driven flux and thereby prevent the accumulation of solutes along the contact line Please see the link below for a short presentation and movies: http://www.youtube.com/watch?v=xwipCVZnN4E

[1]We thank the Chemical Sciences division of the Netherlands Organization for Scientific Research (NWO-CW) for financial support (ECHO grant).

Burak Eral
Physics of Complex Fluids Group, University of Twente

Date submitted: 28 Jul 2011 Electronic form version 1.4