Supplementary Information:

EW does not only provide a mean to suppress coffee stain effect but also provides control over the extent and size of Coffee stains. Figure S1 provides the intensity profiles and pictures of three residues: [1] Control experiment where the drop is allowed to evaporate on the same substrate, [2]: Partially suppressed coffee stain where the applied voltage is turned off prior to complete evaporation and [3] Complete suppression of coffee stain where the drop is treated with EW throughout the course of the evaporation. The drops are prepared with 5 µm Polystyrene particles dispersed in 10 mM LiCl dissolved in deionised water.

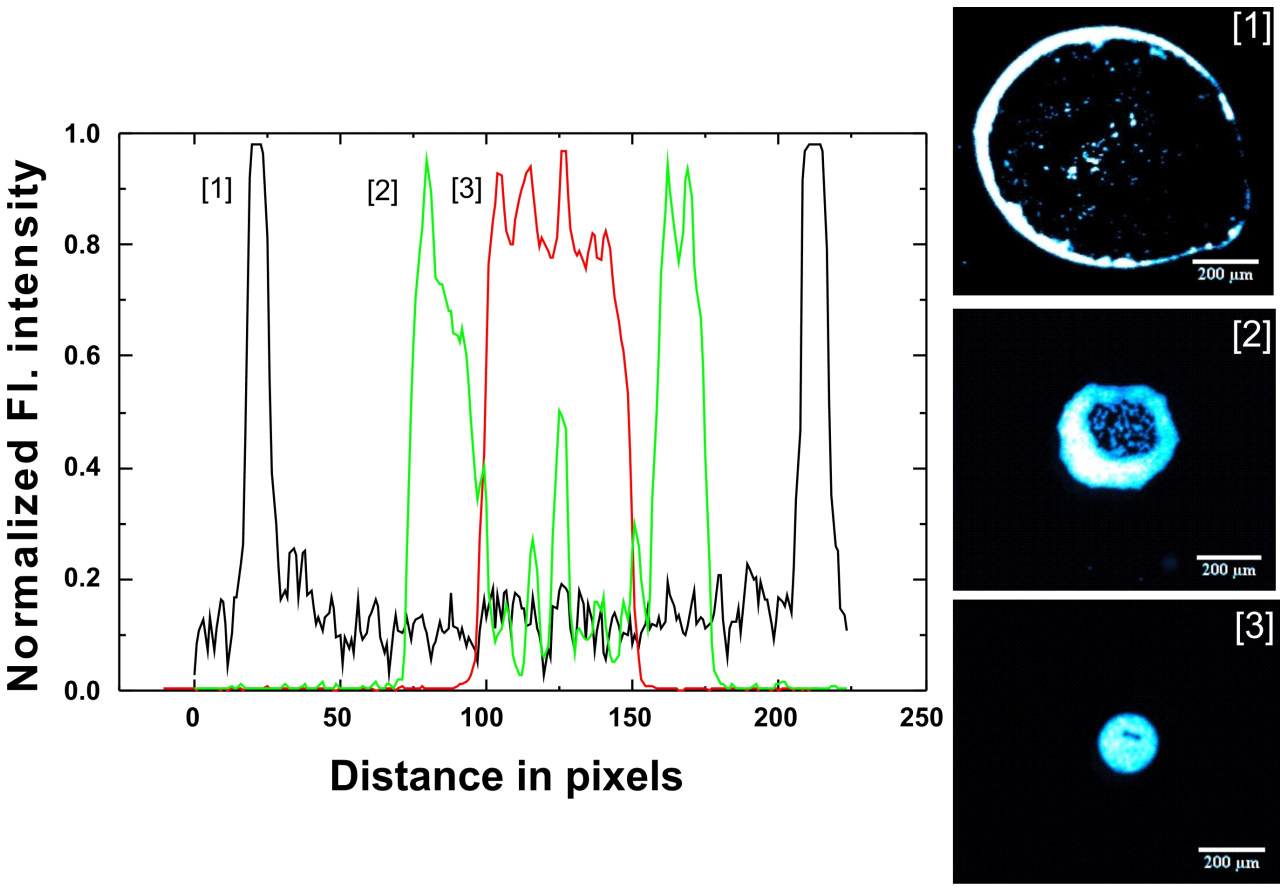

Fig.S1 Illustration EW control over the size of Coffee stain.

Coffee stain effect is most undesired in the combinatorial analysis methods such as microarrays and MALDI-MS as it dramatically

reduces the efficiency and reproducibility of these methods. These methods are the workhorse of analytical biochemistry and require parallelization of the detection process due to often very large number of biological material combinations. In Figure A1, we demonstrate the parallelization of the proposed technique with interdigitated electrodes. The drops of 5 µm Polystyrene particles dispersed in water are placed on the interdigitated electrodes illustrated in Figure 1 of the main text. The drops are allowed to evaporate as the as the contact line is mobilized with EW. The Movie S2 gives the complete evaporation process.

X

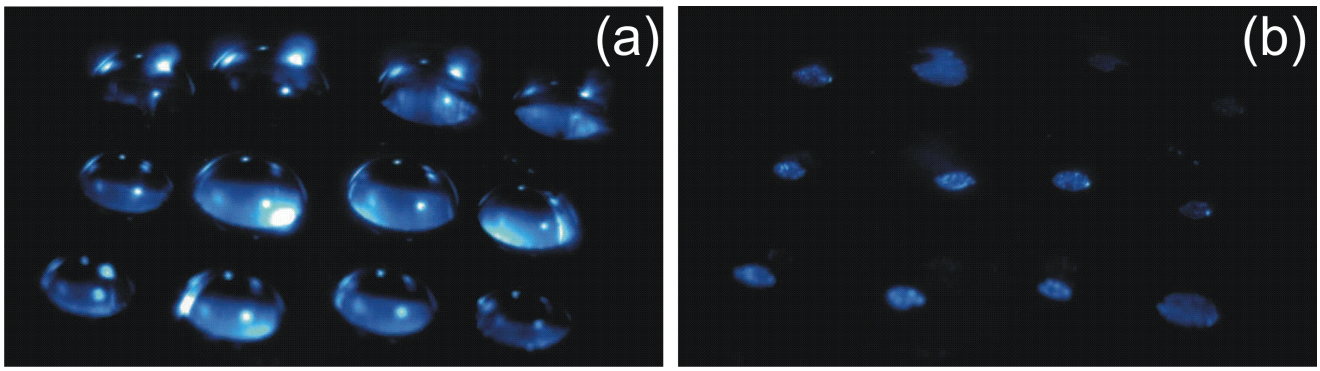

Fig.S2 Illustration of the interdigitated electrode setup where many drops can be treated in parallel. Panel a and b demonstrate an array of drops prior to and after evaporation respectively

An alternative to Fig. 3 where the contact angle and the normalized drop radius are plotted in a single figure for ease of comparison. This figure allows the reader to directly compare the evolution of the contact angle and the drop radius.

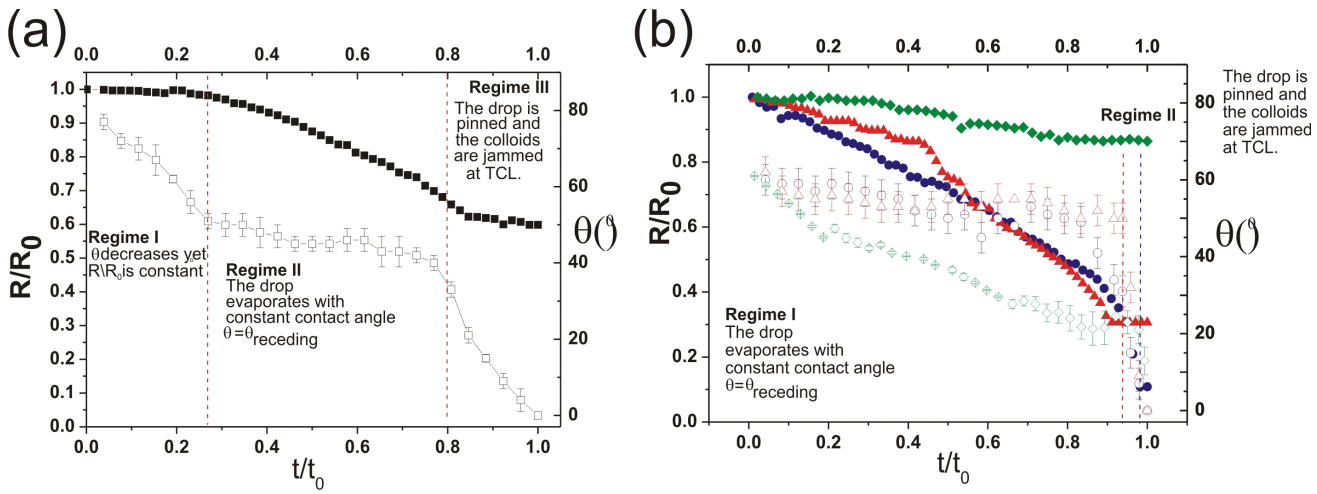

Fig.S3 Normalized radius of evaporating drop (R/R_0 open symbols) and contact angle (θ full symbols) as a function of normalized time for control experiment where no EW is applied (Panel (a)) and different frequency regimes (Panel (b)). The time is normalized with respect to time required for complete evaporation and radius is normalized with respect to initial drop radius (R_0).The solute used in experiment is 5 µm diameter carboxylate terminated Polystyrene particle in Millipore water with 10 mM LiCl. The squares in Panel (a) represent the experiment where no EW was applied and the drop is allowed to evaporate. In Panel (b) the green diamonds represents 100 kHz, the blue circles 1 kHz and the red circles 6Hz.

Movie Index:

Movie S1: Suppression of Coffee stain effect

The movie S1 shows two 0.5 microliter droplets of 5 micron diameter Polystyrene particles suspended in 10mM LiCl. The droplets are placed on a moderately hydrophobic dielectric substrate (SU8). The droplet in the right hand side is treated with EW (U=200V 6Hz) whereas the one on left hand side is allowed to evaporate with no interference (reference case). As the drop evaporates the EW treated drop leaves behind a single homogeneous spot as opposed to reference case. The electrowetting setup used in this experiment is the conventional EW setup described in the middle row of Figure 1 (main text). These experiments were conducted subsequently on the same substrates and placed later joined together with video editing software foe ease of presentation.

Movie S2: Demonstration of Shearing effect.

At 1 kHz applied voltage, internal flows mixing and shearing the colloidal particles away from the contact line are observed. The shearing forces can unjam particles stuck in the vicinity of the contact line and avoid the extra pinning. The

droplet is treated with EW (U=200V, 1 kHz) with the conventional EW setup.

Movie S3: Demonstration of parallelization

The movie S2 shows twelve 0.5 microliter droplets of 5 micron diameter Polystyrene particles suspended in 10mM LiCl, placed on interdigitated electrodes placed under moderately hydrophobic dielectric substrate (SU8).

Movie S4: Comparative demonstration with interdigitated electrodes

In this movie which is the analog of Movie S1 but with interdigitated electrodes two 1 microliter droplets of 5 micron diameter Polystyrene particles are suspended in 10mM LiCl. The droplets are placed on interdigitated electrodes coated with moderately hydrophobic dielectric substrate (SU8). The droplet in the right hand side is treated with EW (U=200V 1 kHz with 100 Hz modulation) whereas the one on left hand side is allowed to evaporate with no interference (reference case). As the drop evaporates the EW treated drop leaves behind a single homogeneous spot as opposed to reference case.