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Electrocoalescence behavior exhibited by anchored aqueous droplets in air RAUNAQ HASIB, ROCHISH THAOKAR, Indian Institute of Technology Bombay — Electrocoalescence of droplets is the preferred method in phase separation owing to its low energy consumption. In this work, effect of droplet conductivity on electrocoalescence phenomena is studied for an anchored droplet-in-air system under the influence of direct current electric field. Phase diagrams representing the coalescence/non-coalescence behaviour are constructed for three different droplet conductivities. Droplets of deionized water, 0.01 M NaCl solution, and 1 M NaCl solution are used for low, moderate and high conductivity experiments, respectively. Subsequent events after first non-coalescence event are also studied and an effort is made to explain and categorize the behaviour under different regimes. Beyond the critical electrocapillary number (estimated to be ~ 0.25), the stabilizing capillary force cannot balance the destabilizing electric force which leads to contact of droplets. Variation in drop conductivity, cone angle, and separation distance between droplets do not influence the critical electrocapillary number. Low light experiments were conducted to detect presence of sparks during the non-coalescence events. The non-coalescence mechanism is observed to differ with change in droplet conductivity.

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