

## **S1.5.1 SEPARATION OF DISPERSED WATER DROPS FROM DIESEL FUEL USING MESH-BASED ELECTROWET-COALESCENCE DEVICE**

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The objective of the coalescence is to increase the drop size (Water drops) in a non-miscible flowing liquid (Ultra Low Sulfur Diesel, ULSD) by passing the water-ULSD emulsion through an electric field between dielectric coated electrodes that are easier to separate from the ULSD stream. This study builds upon prior work of electrowet-coalescence in thin-slit-radial-flow between two disk-shaped electrodes. In this work, the thin-slit-radial flow EWC has been replaced by flow through wire mesh electrodes.

The hypothesis is that the confining space of pores in a wire mesh will strongly attract and hold the drops as the emulsion flows through the mesh. The wire will have a larger surface area to enhance the contact with the water drops to slow them down. This will result in greater adherence of water droplets on the mesh surface and thus, will increase the coalescence. The SS mesh EWC device is very compact compared to the thin-slit-radial flow device. The electric potential difference required for electrowetting is in the range of 90-120V.

This paper discusses the principles of electrowetting. The parameters controlling the effective electrowetting by using SS wire mesh are discussed and consideration given to EWC design.