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Electrowetting Control of Droplets for Biomedical Applications on Chips

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Electrowetting on dielectric (EWD) is the phenomenon whereby an electric field can modify the wetting behavior of a polarizable and/or conductive liquid droplet in contact with a hydrophobic, insulated electrode. The application of a voltage between the liquid and the electrode results in an electric field across the insulator that lowers the interfacial tension between the liquid and the insulator surface according to the Lippman-Young equation. Droplet transport is performed over contiguous electrodes, which connect different fluidic operations on chip. In biomedical applications it is required to transport biological liquids and beads. The transport of non-biological electrolytes using electrowetting has been demonstrated both in air and in other immiscible media such as silicone oil. Complex, programmable assays have been demonstrated.