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Elasticity modulated Electrowetting of a sessile liquid droplet SUMIT KUMAR, SRI GANESH SUBRAMANIAN, SUNANDO DASGUPTA, SUMAN CHAKRABORTY, Indian Inst of Tech Kharagpur — The sessile liquid droplets on the elastic and soft deformable surface produce strong deformation near the three-phase contact line (TPCL). The capillary and elastic forces play an important role during this deformation, and deteriorate the wetting behaviour of a sessile drop. The present work combines the effects of liquid viscosity and substrate elasticity on the dynamics of EWOD. The influence of decreasing film elasticity and viscosity on the electrowetting response of a sessile drop is experimentally investigated by delineating the changes in equilibrium apparent contact angles on substrates with varying Young's modulus of elasticity. The increase in viscosity of the liquid leads to greater electrowetting for non-deformable substrates whereas; the dynamics are not greatly affected in case of soft substrates. Although the viscosity appears to be an influential factor, the dynamics are more skewed towards the substrate rigidity. The vertical component of Young's force creates a wetting ridge at the three-phase contact line, the height of which is a direct function of the substrate rigidity. The produced ridges reduce the overall wettability of the droplet.

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