

Charge deposition by moving contact lines reduces contact angles

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Slide electrification-spontaneous charge separation at receding contact line has been reported to result in an electrostatic potential of around 1 kV and significantly affect drop motion. In order to find out how slide electrification influences contact angle, we examined the dynamic contact angles of aqueous droplets at various salt concentrations sliding down surfaces. We compare drops sliding down insulated surfaces for cases where the drop can charge up and cases where the drop is grounded along the entire drop pathway. This comparison exhibits that two electrification effects play a role in the reduction of dynamic contact angles: (a) the well-known reduction in contact angles, owing to electrowetting effects. (b) A decrease in receding contact angle owing to free surface energy changes of the solid at the rear side as a result of surface charge deposition. The latter effect changes surface energy in the order of 10 mN/m, leading to a substantial change in contact angle ($\sim 10^\circ$), which should be considered in many works dealing with contact angle hysteresis on dielectric substrates.

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Sitzung Einordnung: Short Talks