

Abstract Submitted
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Flow within an evaporating glycerol-water binary droplet: Segregation by gravitational effects YAXING LI, PENGYU LV, CHRISTIAN DID-DENS, Univ of Twente, HERMAN WIJSHOFF, Oce Technologies B.V., MICHEL VERSLUIS, Univ of Twente, DETLEF LOHSE, Univ of Twente, Max Plank Institute for Dynamics and Self-Organization — The flow within an evaporating glycerol-water binary droplet with Bond number $Bo \ll 1$ is studied both experimentally and numerically. First, we measure the flow fields near the substrate by micro-PIV for both sessile and pendant droplets during evaporation process, which surprisingly show opposite radial flow directions – inward and outward, respectively. This observation clearly reveals that gravitational effects play a crucial role in controlling flow fields within the evaporating droplets. We theoretically analyse that this gravity-driven effect is caused by density gradients due to the local concentration difference of glycerol within the droplet triggered by different volatilities of the two components during evaporation. Finally, for confirmation, we numerically simulate the process, revealing a good agreement with experimental results.

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