Experimental investigations and numerical predictions of steady state microdroplet evaporation experiments are presented. Steady state droplet evaporation experiments are conducted to understand (1) Droplet contact line influence on evaporation rate efficiency, (2) Droplet contact angle correlation to evaporation rate and (3) Substrate cooling. Experiments are performed on a polymer substrate with a moat like trench (laser patterned) to control droplet contact line dynamics. A bottom-up methodology is implemented for droplet formation on the patterned substrate. Droplet evaporation rates on substrate temperatures $22\degree F \leq \Delta T_{Substrate} \leq 70\degree F$ and contact angles $80\degree \leq \theta \leq 110\degree$ are measured. For a pinned microdroplet (CCR), volumetric infuse rate influences droplet contact angle. Results illustrate droplet contact line impact on evaporation rate. Moreover, these results coincide with previously published results and affirm that evaporation rate efficiency reduces with contact line depinning. Additionally, from all the analyzed experimental cases, evaporation rate scales proportional to the microdroplet contact angle (i.e. $\dot{m}_{LG} \propto \theta$). In conclusion, these experiments shed new light on steady state evaporation of a microdroplet and its corresponding observations. Vital research findings can be used to enhance heat dissipation from tiny surfaces.

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The public is welcome to attend.