Announcing the Final Examination of Harish Voota for the degree of Master of Science

Time & Location: July 7, 2015 at 2:30 PM in ENG1 288

Title: ANALYSIS OF STEADY STATE MICRO-DROPLET EVAPORATION TO ENHANCE HEAT DISSIPATION FROM TINY SURFACES

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 $22^\circ C \leq \Delta T_{Substrate} \leq 70^\circ C$ and contact angles $80^\circ \leq \theta \leq 110^\circ$ 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.

Major: Mechanical Engineering

Educational Career:
Bachelor's of Mechanical Engineering, BS, 2013, Punjab Technical University

Committee in Charge:
Shawn Putnam, Chair, Mechanical and Aerospace Engineering
Jeffrey Kauffman, Co-Chair, Mechanical and Aerospace Engineering
Subith Vasu Sumathi, Committee member, Mechanical and Aerospace Engineering

Approved for distribution by Shawn Putnam, Committee Chair, on December 17, 2014.

The public is welcome to attend.