Abstract Submitted
for the DFD12 Meeting of
The American Physical Society

Dropwise condensation on a cold gradient substrate[1] ASHLEY MACNER, SUSAN DANIEL, PAUL STEEN, Cornell University — Distributions of drops that arise from dropwise condensation evolve by nucleation, growth, and coalescence of drops. An understanding of how surface-energy gradients applied to the substrate affect drop growth and coalescence is needed for design of effective surfaces for large-scale dropwise condensation. Transient dropwise condensation from a vapor phase onto a cold and chemically treated surface is reported. The surfaces were treated to deliver either a uniform contact-angle or a gradient of contact-angles by silanization. The time evolution of drop-size and number-density distributions is reported. For a typical condensation experiment, the drop distributions advance through two stages: an increase in drop density as a result of nucleation and a decrease in drop density as a result of larger scale coalescence events. Because the experiment is transient in nature, the shape of the distribution can be used to predict the number of drop generations and their stage of development. Preliminary results for gradient surfaces will be discussed and compared against observations of behavior on uniformly coated surfaces.

[1]NASA Space Technology Research Fellowship (NSTRF)

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Date submitted: 07 Aug 2012 Electronic form version 1.4