Abstract Submitted
for the DFD17 Meeting of
The American Physical Society

Enhanced Condensation Heat Transfer On Patterned Surfaces
ELAHEH ALIZADEH-BIRJANDI, H.PIROUZ KAVEHPOUR, University of California, Los Angeles (UCLA) — Transition from film to drop wise condensation can improve the efficiency of thermal management applications and result in considerable savings in investments and operating costs by millions of dollars every year. The current methods available are either hydrophobic coating or nanostructured surfaces. The former has little adhesion to the structure which tends to detach easily under working conditions, the fabrication techniques of the latter are neither cost-effective nor scalable, and both are made with low thermal conductivity materials that would negate the heat transfer enhancement by drop wise condensation. Therefore, the existing technologies have limitations in enhancing vapor-to-liquid condensation. This work focuses on development of surfaces with wettability contrast to boost drop wise condensation, which its overall heat transfer efficiency is 2-3 times film wise condensation, while maintaining high conduction rate through the surface at low manufacturing costs. The variation in interfacial energy is achieved through crafting hydrophobic patterns to the surface of the metal via scalable fabrication techniques. The results of experimental and surface optimization studies are also presented.

Elaheh Alizadeh-Birjandi
University of California, Los Angeles (UCLA)

Date submitted: 01 Aug 2017 Electronic form version 1.4