Abstract Submitted
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Experimental results and a self-consistent model of evaporation and high heat flux extraction by evaporating flow in a micro-grooved blade[1] REZA MONAZAMI, MEHDI SAADAT, JIANZHONG ZHU, HOSSEIN HAJ-HARIRI, University of Virginia — The problem of evaporation from a vertical micro-grooved blade heated from above is investigated. The required superheat to handle the incoming flux is calculated using the results of the study by Monazami and Haj-Hariri (2012). The relation between the applied heat flux, dry-out length and the maximum equilibrium temperature for several geometries and working fluids are studied. Furthermore, a computational study of the evaporating meniscus is conducted to evaluate the evaporation rates and dissipated heat flux at the liquid-vapor interface. The computational study accounts for the flow and heat transfer in both liquid and vapor phases. The results of this study indicate that the micro-grooved structure can dissipate heat fluxes as high as 10MW/m2 for superheats as low as 5 degrees Kelvin. Experiments are conducted to verify the computational and analytical results. The findings of this work are applicable to the design of thermal management systems for high heat flux applications. *Ref:* Monazami, R. and Haj-Hariri, H. A mathematically-consistent formulation for evaporation of menisci in microchannels. American Physical Society, 65th Annual DFD Meeting, San Diego, CA, Nov 1820, 2012.

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