Abstract Submitted
for the DFD15 Meeting of
The American Physical Society

Valve-less microdispenser MING KWANG TAN, WANG XIN, WENG KENT LEE, Monash University Malaysia, Jalan Lagoon Selatan, 47500 Bandar Sunway — We demonstrate the concept of valve-less microdispenser to control of the liquid flow through the nozzle, by incorporating Leidenfrost effect into the nozzle design. When the nozzle is heated above the Leidenfrost point, a thin vapor layer is formed between the heated substrate and the liquid above it. The vapor pressure due to the presence of the vapor layer, together with the effect of surface tension of the liquid, exerted on the liquid-vapor interface, preventing the flow of the liquid through the nozzle. The experimental results shown that nozzles of diameter 400 micrometer and below, the nozzle temperature of 150 degree Celsius is sufficient to prevent the continuous flowing of the liquid, whereas for nozzles of diameter between 400 to 500 micrometer, the nozzle temperature needs to increase to 160 degree Celsius in order to prevent the continuous flowing of the liquid. When nozzle temperature below 160 degree Celsius, intermittent ejection of microdroplets, whose size is a function of nozzle temperature, is observed.

Ming Kwang Tan
Monash University Malaysia, Jalan Lagoon Selatan, 47500 Bandar Sunway

Date submitted: 01 Aug 2015 Electronic form version 1.4