Electrical Actuation of Droplets for Microelectronics Cooling

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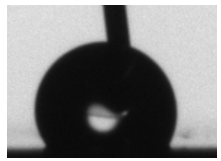
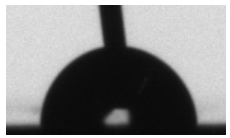
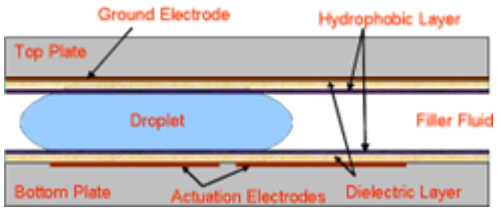
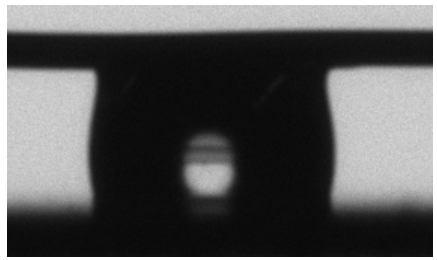
Objective

Develop technologies enabling electrical actuation and control of droplets for providing chip-integrated thermal management solutions



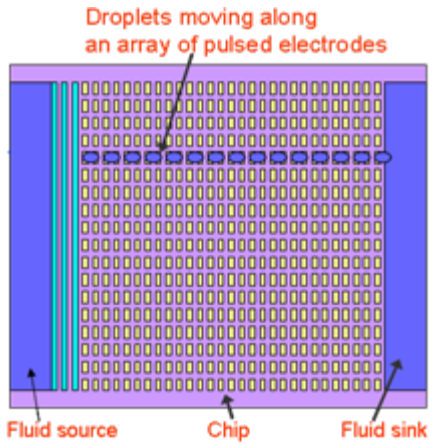


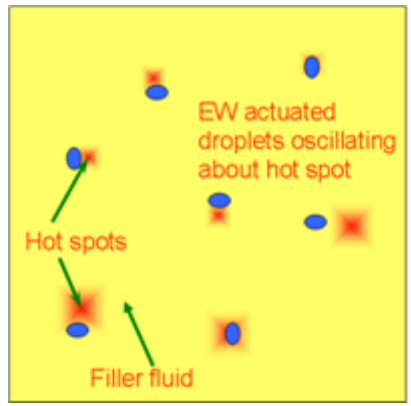




Advantages

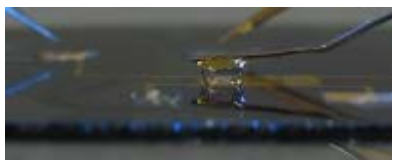
- Significantly enhanced control of flow at the microscale
- High liquid velocities at low voltages
- Noiseless, very low power consumption
- Solutions for chip-level and hot-spot thermal management

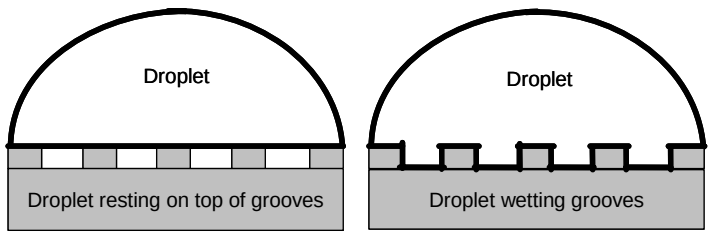




Approaches

- Electrowetting (electrical control of surface tension) based actuation of electrically conducting droplets
- Electric field-based actuation of dielectric droplets
- Experimental characterization of droplet flow and heat transfer
- Electrically tunable thermal resistance switch through control of droplet states on artificially roughened surfaces





Publications

- Bahadur V. and Garimella, S.V., *Langmuir*, 2007 (in press)
- Bahadur V. and Garimella, S.V., *J. Micromechanics Microengineering*, **16**:1494-1503, 2006
- Patent application filed May 2006, #60/747,980

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