Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

Wetting dynamics of a droplet on micro-pillar surfaces with radially varying pitch RAJNEESH BHARDWAJ, MANISH KUMAR, Department of Mechanical Engineering, Indian Institute of Technology Bombay, Mumbai 400076, India, KIRTI CHANDRA SAHU, Department of Chemical Engineering, Indian Institute of Technology Hyderabad, Sangareddy 502 285, Telangana, India — We experimentally investigate the wetting dynamics of a droplet placed gently on a square-micropillar surface. These pillars are located with a radially varying pitch described by a parabolic equation. Two sets of surfaces with radially increasing and radially decreasing pitches from the center of the substrate at which the droplet is initially placed have been prepared on silicon wafer using photolithography. Due to the radial variation of the pitch, the droplet experiences a wettability gradient (either increasing or decreasing radially). We observed that on the surface with the radially increasing pitch, the droplet remains in the Cassie state and exhibits higher contact angle than the smooth surface during its spreading stage. On the other hand, in case of the surface with radially decreasing pitch, the droplet goes into the Wenzel state and assumes a lower contact angle as compared to that observed in the smooth surface. The wetted diameter of the droplet is found to be smaller in case of the radially decreasing surface than the radially increasing surface. We also studied the effect of the size of the square pillars and it is found the droplet spreads less in case of smaller size of pillars for both radially increasing and decreasing surfaces.

Manish Kumar
Dept of Mechanical Engineering, Indian Institute of Technology Bombay

Date submitted: 01 Aug 2019 Electronic form version 1.4