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Effect of wettability and topological features of Namib beetle inspired bumps on dropwise condensation. SHAKEEL AHMAD, HUI TANG, HAIMIN YAO, Hong Kong Polytech Univ — The Stenocara beetle lives in arid desert environment where the only available source of water is fog droplets. The beetle contains many hydrophobic/hydrophilic bumps on its back. Water collection occurs on the hydrophilic patches. Once the droplet reaches the critical volume, it sheds down due to gravity. Although a number of studies on condensation and water collection on beetle inspired structures have been reported in literature, most of them were on micro/nano scale textures. However, in nature the beetle bumps are in millimeter scale. At this scale the role of topological features and gravity becomes crucial for early droplet shedding. Therefore, in this work we numerically investigated the effects of bump shape, wettability contrast, surface slope and hydrophilic patch to total area ratio on droplet shedding volume and time. A three-dimensional lattice Boltzmann method (LBM) based numerical framework was used for the simulations. Compared with bumps of other shapes such a cube or a circular cylinder, faster droplet shedding was obtained over a hemispherical bump. Furthermore, it was found that larger hydrophilic patch to total area ratio for the hemispherical bump significantly increased the droplet shedding time.

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