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Spreading and Fragmenting Characteristics of Impacting Droplet on Micro/ Nanostructured Water-Repellent Surfaces[1] HYUNGMO KIM, CHAN LEE, Department of Mechanical Engineering, MOO HWAN KIM, Division of Advanced Nuclear Engineering, JOONWON KIM, Department of Mechanical Engineering — After impact on a solid surface a droplet spreads, but in different ways such as deposition, rebound, and fragmentation. Because fragmentation occurs when the kinetic energy beat the surface energy during impact, Weber number is the most important dimensionless number in the rebound/fragmentation criteria. This also can be dramatically changed by the micro/nano-scale surface structures. Different micro/nanostructured surfaces were fabricated using silicon wet etching, black silicon formation, or the combination of these methods. Then, spreading and fragmenting events were analyzed with supporting experimental results. On the surfaces, the microstructures form obstacles to drop spreading and retracting, the nanostructures give extreme water-repellency, and the hybrid micro/nanostructures facilitate droplet fragmentation. Especially, the Cassie-Baxter's fraction factor of the microstructures can change rebound/fragmentation criteria. From this work, we finally investigate how the micro/nanostructures can change spreading and fragmenting dynamics during droplet impact.

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