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Binary Droplet Wetting States on Structured Surfaces[1]
KHALOUD AL BALUSHI, KHELLIL SEFIANE, The University of Edinburgh, DANIEL OREJON, The University of Edinburgh and I2CNER — The interaction between liquid and solid substrates is of great importance and offers an interesting and complex phenomenon of interest to many industrial and everyday applications. In this work, we report on the different wetting behaviors observed upon binary mixture droplet deposition on structured surfaces. The extent of wetting and the wetting regimes when depositing pure water, ethanol and their mixtures on micro-structured surfaces have been found to be highly dependent on the concentration of the mixture and the spacing between pillars. For pure water on short spaced structures, the droplet rests in the Cassie-Baxter (CB) mode, whereas as the spacing between pillars increases droplets typically sit in an intermediate regime or partial wetting regime (where part of the droplet rests above the structures while other regions penetrate within the structures). In the case of pure ethanol or low surface tension mixtures, droplets tend to be in the Wenzel regime. Moreover, for different binary mixtures, hemi-wicking and intermediate regimes have also been noticed depending on the different spacing. Our work is focusing on studying these different wetting regimes, providing a universal wetting regime map for binary mixture on structured surfaces and giving a theoretical and practical explanation for them.

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