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Universal wetting transition of an evaporating water droplet on superhydrophobic surfaces PEICHUN AMY TSAI, ADRIEN BUSSONNIRE, MASOUD BIGDELI, University of Alberta, DI-YEN CHUEH, Academia Sinica, Taiwan, QINGXIA LIU, University of Alberta, PEILIN CHEN, Academia Sinica, Taiwan — An evaporating water droplet on a superhydrophobic surface undergoes a wetting transition from a heterogeneous wetting (Cassie-Baxter) to homogeneous wetting (Wenzel) state. The critical transition is manifested by a sudden decrease of contact angle, when "Fakir water drop permeates the minute hydrophobic cavities. This breakdown of superhydrophobicity would hinder various applications of self-cleaning, low-frictional, and potentially ice-phobic properties of superhydrophobic materials. In this work, we experimentally investigate such wetting transition using hydrophobic nanostructures. With a theoretical model, we find a universal criterion of the critical contact angle at the transition point. The prediction of critical contact angle, which solely depends on the geometrical parameters of the hydrophobic pillars, agree well with various data for both micro- and nano-structures.

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