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Surface structure determines dynamic wetting[1] JUNICHIRO SHIOMI, JIAYU WANG, The University of Tokyo, MINH DO-QUANG, The Royal Institute of Technology, JAMES CANNON, FENG YUE, YUJI SUZUKI, The University of Tokyo, GUSTAV AMBERG, The Royal Institute of Technology — Dynamic wetting, the spontaneous spreading process after droplet contacts a solid surface, is important in various engineering processes, such as in printing, coating, and lubrication. In the recent years, experiments and numerical simulations have greatly progressed the understanding in the dynamic wetting particularly on "flat" substrates. To gain further insight into the governing physics of the dynamic wetting, we perform droplet-wetting experiments on microstructured surfaces, just a few micrometers in size, with complementary numerical simulations, and investigate the dependence of the spreading rate on the microstructure geometries and fluid properties. We reveal that the influence of microstructures can be quantified in terms of a line friction coefficient for the energy dissipation rate at the contact line, and that this can be described in a simple formula in terms of the geometrical parameters of the roughness and the line-friction coefficient of the planar surface. The systematic study is also of practical importance since structures and roughness are omnipresent and their influence on spreading rate would give us additional degrees of freedom to control the dynamic wetting.

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Junichiro Shiomi
The University of Tokyo

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