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Activated wetting dynamics in the presence of mesoscopic surface disorder KRISTINA DAVITT, Laboratoire de Physique Statistique - ENS, MICHAEL PETTERSEN, Washington and Jefferson College, ETIENNE ROLLEY, Laboratoire de Physique Statistique - ENS — Although disorder is commonly used to explain contact angle hysteresis, it is often neglected when considering wetting dynamics. When viscous forces are negligible, contact-line velocity is modelled by the Molecular Kinetic Theory [1], which predicts an activated motion driven by molecular jumps on preferential adsorption sites. We believe that in the presence of mesoscopic disorder, this model can be reinterpreted and that the activation length is no longer molecular-sized but is related to depinning events on the surface. This hypothesis is supported by a study of the wetting of cesium by liquid hydrogen in which it was shown that the activation length is of the order of the expected roughness [2]. However, no systematic study between the activation area and the length scale of the disorder has previously been made. We study wetting dynamics on metal films evaporated under different conditions, allowing us to obtain films with lateral grain sizes ranging from 10 to 200 nm. We find that the activation area deduced from wetting experiments is coherent with these sizes; however, its precise relation to the scale of disorder is not clear.
[1] T.D. Blake and J.M. Haynes, J. Colloid Interface Sci. 30, 421 (1969)
[2] E. Rolley and C. Guthmann, PRL 98, 166105 (2007)

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