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Static and dynamic wetting of soft substrates

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Abstract

A survey of recent literature on wetting phenomena reveals that there is a fast-growing interest in wetting of soft or deformable substrates, due to its potential applications in many industrial, technical and biological processes. Unlike rigid substrates, a droplet deposited on a soft substrate deforms the substrate via a combination of the normal component of surface tension and the Laplace pressure, i.e. by capillary force and the action of disjoining pressure. In turn, the capillary and disjoining pressure-induced substrate deformation affects the wetting phenomena on the substrate. In this review, we summarize recent achievements on static and dynamic wetting of soft substrates and provide an outlook to future progress. In static wetting, theoretical, numerical and experimental investigations of capillary and disjoining pressure-induced substrate deformation are introduced, and corresponding effects on contact angle and contact angle hysteresis are discussed. In dynamic wetting, the influence of substrate stiffness on spontaneous wetting, droplet impact dynamics, and other types of forced wetting and dewetting is considered. Finally, other interesting