Supplementary Information

Capillary force on a tilted cylinder: Atomic Force Microscope (AFM) measurements
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SI.1 Capillary rise experiment

A capillary rise experiment was performed to obtain the values of $\gamma \cos \theta$ for decane and for dodecane. By measuring optically the height of capillary rise $h_j$ in clean glass tubes of inner diameter going from 0.2 mm to 0.5 mm, it is possible to measure $\gamma \cos \theta$ through Jurin’s law with the following expression:

$$ h_j = \frac{4 \gamma \cos \theta}{d \rho g}, $$(1)

with $\rho$ the liquid density, $d_j$ the tube’s inner diameter, and $g$ the standard gravitational acceleration on Earth. This experiment was performed in the same room as the AFM experiments, thus in the same temperature and humidity conditions, with the same liquids (decane and dodecane). In figure SI.1, $h_j$ is plotted as a function of $\frac{4}{d \rho g}$ for decane and dodecane. A one parameter linear fit of the data yields $\gamma \cos \theta$ as the fitting parameter.

![Figure SI.1](image1)

Figure SI.1 Height of capillary rise $h_j$ as a function of $\frac{4}{d \rho g}$, for decane (blue diamonds) and dodecane (black triangles). The dashed lines are linear fits with a zero y-intercept.

SI.2 Discussion on the choice of $h = 0$

As explained in the article, the deflection $d$ as a function of the immersion depth $h$ is fitted linearly. This implies that the value of y-intercept $d_0$ depends on the choice of the origin of the distance $h = 0$. To test the consequences of this choice, we compare in figure SI.2 normalized y-intercepts $\frac{h_0}{\pi D_0}$ obtained with $h = 0$ set at the meniscus breakup (same data as in the bottom panel of the paper’s figure 4, for dodecane on the 3 probes), with the ones obtained from the same deflection data, but with $h = 0$ set at the meniscus formation (named phase 2 in the paper). The difference between the data points obtained with the two references increases with the immersion angle $i$, as the slope $s$ of the deflection data also increases with $i$. When fitting the normalized $d_0$ versus $\tan i$ data with straight lines, the slope $s_D$ is about 4% smaller for probes # 1 and 3 and 8% smaller for probe # 2 when defining $h = 0$ at the meniscus formation rather than breakup. This means that measuring $\gamma \cos \theta$ from the $s_D$ data, following method 2, also implies an additional systematic error due to the choice of $h = 0$, of the order of a few percents. There is however less than 0.5% difference in the y-intercept $\delta_0$ values. This means that measuring $\gamma \cos \theta$ from the $\delta_0$ data, following method 1, is robust with respect to the choice of $h = 0$.

![Figure SI.2](image2)

Figure SI.2 Normalized y-intercept $\frac{h_0}{\pi D_0}$ as a function of $\tan i$, for dodecane on probe # 1 (triangles), 2 (circles) and 3 (squares). Black: $h = 0$ set at meniscus breakup (same data as in the bottom panel of figure 4 in the main paper). Grey: $h = 0$ set at meniscus formation. The lines are linear fits of the data.