Making a splash with water repellency

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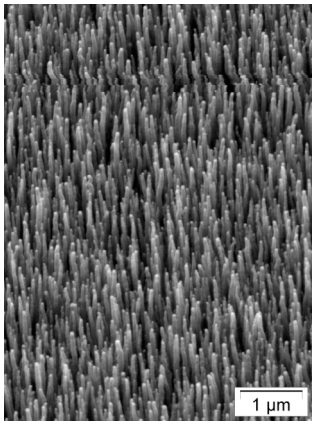
In this talk, I will discuss various routes we did follow to control small and large scale hydrodynamic flows using specific modifications of the surface coating. I will in particular focus on the dynamical properties of liquids at superhydrophobic surfaces, which exhibit the so-called 'Lotus' effect. In this context, I will first report on theoretical and experimental investigations of the liquid-solid friction on superhydrophobic surfaces. Superhydrophobic surfaces made of carbon nanotube carpets will be shown to exhibit 'super-lubrifying' properties, in agreement with theoretical predictions. I will then turn to 'splashes' experiments, where a solid object is thrown at large velocity on a liquid surface. I will show how air entrainement - leading to a noisy 'splash' - is intimately linked to wetting properties, in contrast to large scale hydrodynamic expectations. Superhydrophobic impacters always make a big splash.



References :

[1] Joseph et al. "*Slippage of water past superhydrophobic carbon nanotube carpets in microchanels*", Phys. Rev. Lett. **97** 156104 (2006)
[2] Duez et al. "*Making a splash with water repellency*", Nature Physics **3** 180 (2007)