UNIVERSITÉ CÔTE D'AZUR

INPHYNI
INSTITUT DE PHYSIQUE DE NICE

Master OAM – Proposition de projet

A l'Institut de Physique de Nice
CNRS & Université Côte d'Azur

How can droplets bounce on a superhydrophobic solid surface?
(Experimental Study)

General Context – Whether it's to limit fogging, frost, the presence of dirt, or to facilitate fluid flow, there are many practical situations where the aim is to prevent droplets (of water or oil) from adhering to their substrate. Due to the wide range of practical applications, the development of so-called superhydrophobic (anti-adhesive) surfaces has seen significant growth over the past fifteen years. Studies have shown that the key to this surface state lies in the coupling between physical roughness and chemical hydrophobicity [1]. These surfaces exhibit remarkable wetting behaviors, such as the bouncing of water droplets or the observation of liquid sliding on the solid wall [2,3].

Objectives – During this project, we will study the bouncing of droplets on superhydrophobic surfaces. We will specifically seek to determine whether there is a maximum bounce height depending on the drop release height and its volume. The project will be divided into three parts:

1. A theoretical section in which we will explore the physicochemical concepts necessary for understanding surface wetting.
2. A literature review focusing specifically on the characteristics of droplet rebounds.
3. An experimental section that will involve fabricating the surfaces and setting up a system to study the bounce. You will have access to the cleanroom at INPHYNI, as well as all the necessary equipment for the study (inverted microscope, high-speed camera, pressure controller).

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[1] Bhushan B., Jung Y. C., Progress in Materials Science, 56(1), 1-108, (2011).
[2] Cottin-Bizonne C, Barrat J L, Bocquet L, Charlaix E, Low-friction flows of liquid at nanopatterned interfaces Nature Materials, 2(4), 237-240, (2003).
[3] Richard D., Quéré D., Bouncing water drops, EPL (Europhysics Letters), 50(6), 769, (2000).