TUAT Fluid Dynamics Seminar

Micro and nanotextures properties for dynamic antifogging

Lecturer: Dr. **Timothée Mouterde**[1]

Collaborators: Christophe Clanet[2,3] and David Quéré[2,3]

1.Institute for Photon Science and Technology (IPST), The University of Tokyo

2. Physique et Mécanique des Milieux Hétérogènes, UMR 7636 du CNRS, ESPCI, 75005 Paris, France.

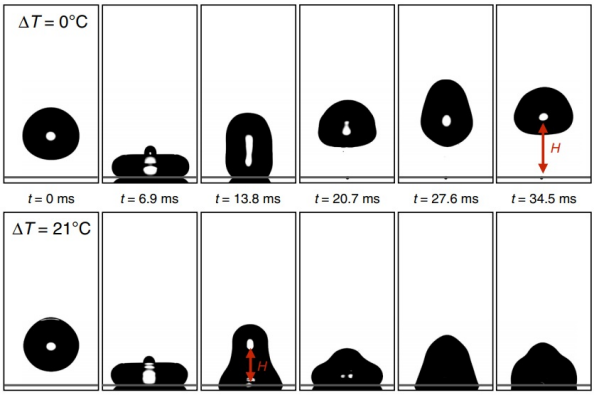
3. Ladhyx, UMR 7646 du CNRS, École Polytechnique, 91128 Palaiseau Cedex, France.

Abstract

A water drop deposited on a hydrophobic micrometric roughness is highly mobile. This property known as superhydrophobicity arises from the air trapped under the drop. However, when condensation forms within the textures, repellency is most often destroyed.

In this work, we explore the possibility to induce antifogging abilities using nanotextured materials, following the example of cicada's wings, shown to expel micrometric drops as they merge. Using model surfaces, we discuss the resistance of nanostructured materials to breath figures and show the full efficiency of nanocones: almost all the merging drops jump off the surface. We will then explore the mechanism responsible for this jumping behaviour with millimetric drops, and how viscosity limits antifogging abilities for microdroplets.

We also describe the adhesion of hot water drops on model nanotextures with various sizes. Our study shows that the denser the textures are, the more resistant the surface is to temperature effects. Surprisingly, we observe the opposite in dynamic conditions: higher structures let more to hot drops bounce. The time needed for condensation to fill the air gap under the drop can be greater than the bouncing time: condensation has no effect on adhesion.



Date : Friday, January 24th, 2020

Place: Building 6 - Room 501

Time : 11:00 - 12:00

organized by: Assoc. Prof. Y. Tagawa (tagawayo@cc.tuat.ac.jp)