



TRIBOLOGY AND BIO-INSPIRED SURFACE ENGINEERING

Responsable(s): Stéphane VALETTE

| Cours : 16 | TD : 8 | TP : 0.0 | Autonomie : 8 | BE : 0.0 | Projet : 0.0 | Langue du cours : AN

Objectifs de la formation

The objective of the course is to establish the relationships between surface functionality and surface morphology, in a biomimicry approach. In terms of surface functionality, the focus will be on the wettability and optical properties of natural textured surfaces. The course should develop knowledge in biomimicry and bio-inspiration of surfaces by offering a description of biological surfaces in terms of morphology and surface chemistry. The morphology and chemistry of plant and animal surfaces will be studied in detail. The morphology/chemistry/wettability relationships of these surfaces will be the focus of this training action. The physics of wetting and adhesion will be studied in detail. The different wettability models will be presented both

Mots-clés : biomimicry, bio-inspired surface, vegetal surface, animal surface, morphology, wetting, adhesion, structural color, adhesion, biodiversity, ecological transition

Programme

Physics of wetting and adhesion I
Physics of wetting and adhesion II
Physics of wetting and adhesion III
Physics of wetting and adhesion - Applications
Structures and functions of plant surfaces for biomimetic innovations
Structures and functions of animal surfaces for biomimetic innovations
Wetting of bio-inspired surfaces
Bibliographic review: bio-inspired super-hydrophobic surfaces
Biomimicry and optical properties: structural coloring

Compétences

- - Know the morphology of natural surfaces (plant and animal) - shapes, dimensions, multi-scale aspects
- - Know the main chemical compounds forming the surface of plant leaves or insect cuticles
- - Know the physical laws of wettability
- - Know how to establish the relationship between wettability and surface morphology - Know how to establish the relationship between structural coloration and surface morphology

Travail en autonomie

Objectifs : Preparation of exercises for training classes.
Bibliographic study of recent biomimicry and surface engineering publications: training in the scientific approach in the context of the ecological transition

Méthodes : Bibliographic study of recent publications, synthesis and oral presentation

Bibliographie

Eddie Y. K. Ng, Yuehao Luo, Eddie Yin-Kwee Ng, *BIO-INSPIRED SURFACES AND APPLICATIONS*, World Scientific, 2016
Edward Yu. Bormashenko *PHYSICS OF WETTING - PHENOMENA AND APPLICATIONS OF FLUIDS ON SURFACES*, De Gruyter, 2017
Robin H. A. Ras and Abraham Marmur *NON-WETTABLE SURFACES: THEORY, PREPARATION AND APPLICATIONS*, Royal Society of Chemistry, 2017

Contrôle des connaissances

Final mark = Knowledge mark = 70% final exam mark + 30% bibliographic assessment mark