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## **Hierarchical Structure and the Rose Petal Phenomenon. A Proposition for Educational Reconstruction in Secondary Education.**

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Nature has developed materials, objects and procedures that occur in the macro-scale as well as the nanoscale. The results of millions of years of biological evolution and the optimized “techniques” developed by the organisms are available to scientists who seek new ideas by studying the solutions provided by nature. The scientific field that allows man to imitate nature and to develop nanomaterials, nanomachines and processes with various desired properties is called Biomimetics. The widespread use of Nanotechnology products by our modern technological society and the growing need of the industry for a working force specialized in this field are two of the main reasons for the introduction of Biomimetics and Nanotechnology in school curricula.

This paper presents a proposal for the introduction in Secondary Education of a highly popular phenomenon from the field of Biomimetics known as the Rose Petal Phenomenon. This is the phenomenon of strong adhesion of small water droplets on some superhydrophobic variants of rose petals. By studying the phenomenon, students have the opportunity to come in contact with several big ideas of science, to understand the possible misconceptions they might have, to get acquainted with scientific processes, scientific instruments, scientific models and to develop important skills. Getting familiar with the hierarchical structure of the surface of a rose petal is essentially an acquaintance with the complexity of surfaces in general. The familiarity with the properties of superhydrophobic surfaces helps them to understand their application of the superhydrophobic behavior in consumer products such as clothing and footwear that are waterproof, windows that do not blur, paint that protects the surface from oxidation, corrosion and pollution etc.

The scientific content of the Rose Petal Phenomenon comes from Bharat Bhushan’s book “Biomimetics: Bioinspired Hierarchical-Structure Surfaces for Green Science and Technology”(1). For the effective integration of this subject in the school classroom, the Model of Educational Reconstruction MER was applied. Following a constructive epistemological orientation, the students’ perceptions, interests, needs and expected difficulties were taken into account. The results of the application of the MER model are the creating of 2 modules and their respective learning objectives to get students acquainted with the phenomenon as well as the science behind it.

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### **References**

1. Bhushan, B. (2016). *Biomimetics: bioinspired hierarchical-structured surfaces for green science and technology*, Springer.

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