



Prof. Dr. Abdelhafed TALEB

Associate professor at Sorbonne University. He earned his PhD in nanomaterials science from UPMC in Paris in 1998, and builds a laboratory facilities at the "Institut de recherche de Chimie Paris" (IRCP / Chimie ParisTech) and created his own group on the development and modeling of new nanostructured materials, nanostructured films design and their applications in various fields such as electrochemical sensing, self-cleaning (hydrophobic) coatings, batteries, corrosion resistant coatings, and magnetic storage support. He has more than 23 years of experience in nanomaterial synthesis, characterizations, and their applications focusing on advanced materials and their applications. He authored and co-authored an important number of high-quality publications and patents focusing on functional nanomaterials materials and their applications

Module
Syllabus

Materials science and engineering

Nanomaterials from the Synthesis to the Energy Applications

Over the last century, the development of nanomaterial science provided new technological opportunities in different fields including energy, environment and health. These developments would surely contribute to the post-fossil energy era. In fact, hybrid nanomaterials are uniquely positioned to offer the possibility to fine-tune their properties, using their size, shape, functionalisation and assembly; in order to fit specific application requirements. These new possibilities are not only limited to the optimization of existing properties but go beyond to introduce and create new properties.

In this context, the energy sector would greatly benefit from these developments and offer new renewable, sustainable and friendly alternatives to fossil resources, which has been proven to be a serious threat to the future of the planet, through its contribution to global warming. In this regard, and due to their properties, nanomaterials have been well explored to improve energy conversion and storage efficiency.

In these presentations, we will introduce the new challenges faced by these new nanomaterials in the energy field. Furthermore, we will review the fundamentals and the most recent developments in the synthesis and characterization of nanomaterials, the new theoretical tools to explore their properties as well as their applications in the energy conversion by solar cells, and the storage in Li-ion batteries. In addition, we will show how this new class of materials hold the promise of enabling an optimized balance between low-cost, high-efficiency requirements, smart renewable, clean energy harvesting as well as the storage.

The objective of these presentations is to give the students a general view of the different developments in the field of nanomaterials. Different aspects specific to nanomaterials (synthesis, properties, etc.) will be discussed and their contribution as a driving force for the emergence of new technologies, often with technical breakthroughs, will be highlighted.

Bachelor level in physical chemistry

Online Classes | 1meeting per week, 1h30 each

Bachelor / Master / PhD

Upon completion of a course, and once the participation has been verified, the candidate will receive an electronic certificate to download, print, and keep in his records / Signed by the VLU/Prof. Abdelhafed TALEB

Nanomaterials and Nanochemistry Editors Catherine Bréchnac, Philippe Houdy, Marcel Lahmani, Springer Link 2007,

Nanomaterials in Energy Devices, Editor Jun Hieng Kiat, CRC Press 2021

Advanced Nanomaterials and Their Applications in Renewable Energy, Editors Jingbo Louise and Sajid Bashir Elsevier ScienceDirect 2015.

- 1- Definitions and terminologies.
- 2- Different families of nanomaterials.
- 3- Manufacturing processes of nanomaterials and their characterization.
- 4- Specific properties of nanomaterials: optical, magnetic and mechanical properties.
- 5- Aging of nanomaterials.
- 6- Applications of nanomaterials in energy field.
- 7- Nanotechnologies market.

Courses description

Course objective

Topics covered and Out of Class

Assignments



Pre-Requis

Delivery & Duration

Who this programme is for

Course Certificate of Completion

Text book

Topics covered/ Course Outline

Media Tools

Online courses / Zoom management by Sabaek for Education & Training (Bahrain)

The student will be able to

(1)Select materials for photovoltaics application, Storage, or other specific applications.

(2)Understand materials by properties targeting energy solution.

(3)Use codes and solve standard problems and computations targeting materials performance for Solar cells, Li-batteries, membranes, Materials for chemical catalysis

(4)Read scientific publications and technical documents dealing with the simulation and modeling

(5)To discuss experiments results and analyse data critically/creatively and draw comprehensive conclusions

Program Learning Outcomes (PLOs)

Application Deadline

Send an e-mail to info@vluplatform.net to receive zoom invitation