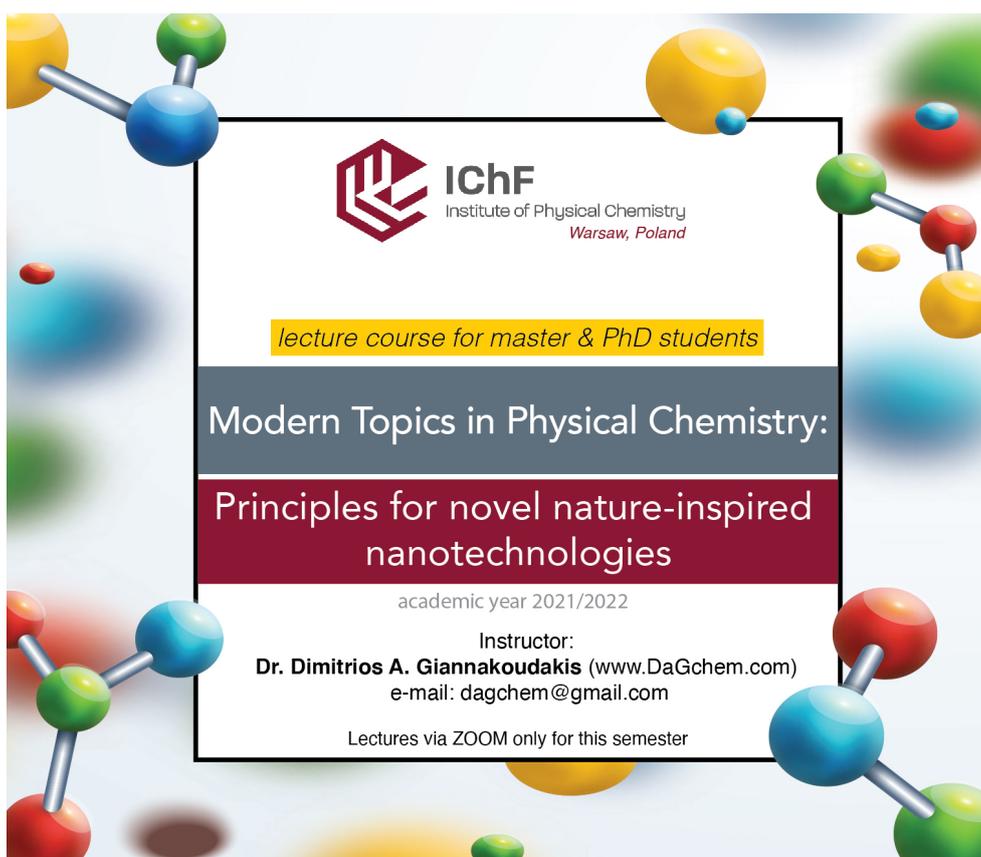


Modern Topics in Physical Chemistry:

Principles for novel nature-inspired (nano)technologies



IChF
Institute of Physical Chemistry
Warsaw, Poland

lecture course for master & PhD students

Modern Topics in Physical Chemistry:
Principles for novel nature-inspired
nanotechnologies

academic year 2021/2022

Instructor:
Dr. Dimitrios A. Giannakoudakis (www.DaGchem.com)
e-mail: dagchem@gmail.com

Lectures via ZOOM only for this semester

INFO

- INSTRUCTOR: Dr. Dimitrios A. Giannakoudakis (dagchem@gmail.com / www.DaGchem.com)
- SCHEDULE: Tuesday or Thursday after 4pm // OFFICE HOURS: online, by appointment
- DATES: registration deadline 15th of October / first session 19th of October (4+1 sessions)

Course Description

Within the goals of the course is to present how the scientific evolution leads to the development of new strategies on (nano)materials design and (nano)technologies based on basic principles of physicochemistry which are used in nature for thousands of years. After an introduction of the most important class of zero-, one-, and two-dimensional nanomaterials and how they can be utilized towards modern nano-structured composite/hybrid materials for a wide range of applications, special emphasis will be given on the exploration of "how" it is feasible to determine their key physicochemical features based on different characterization methods, among others, X-ray diffraction (XRD), X-ray photoelectron spectroscopy (XPS), Scanning Electron Microscope (SEM), Transmission Electron Microscopy (TEM), Atomic Force Microscopy (AFM), and various spectroscopic approaches (Photoluminescence (PL), diffuse reflectance in ultraviolet and visible range of the electromagnetic, Infra-red (IR, Raman), etc). The basic principles behind every characterization method as well as crucial theories such as chemical kinetic and thermodynamic aspects, adsorption and interfacial phenomena, necessary to understand thermo-, sono-, photo-, and/or electro-catalysis, electrochemical sensors/detectors, electroanalytic methods and environmental remediation, will be discussed.

Last but not least it should be mentioned that the orientation of all the above will be on how the presented knowledge on nanomaterials science can be utilized as a useful tool on the every-day scientific interest of each participant having always in mind nature-inspired approaches. The course will be accessible for non-specialists in the field. The presentations and discussion will be initiated by hot and influential literature articles.

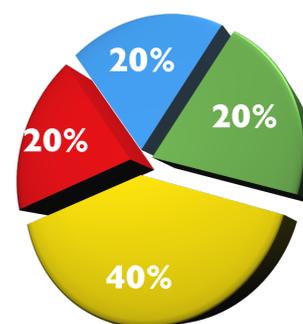
- **PREREQUISITES:** none
- **TEXTBOOK:** Power Point slides as provided after each session

GRADING

The final grade will be based mainly on an in-class presentation on an article and on a final overview on a specific topic (based on 2-4 papers). Details can be seen on the following grading scheme.

- 20% physical participation
 - 20% participation during the in-class discussion
 - 40% In-class presentation
 - 20% final take-home assessment
- BONUS:** 10 % as will be presented after the second session

- **Think GREEN!** Try to use the necessary amount of papers (duplex printing) and ink!



"I hear, I forget. I see, I remember. I do, I understand."
Chinese proverb