“The Self-Repairing World: Exploring the Next Generation of Smart Coatings and Their Impact”

I.A. Kartsonakis

Laboratory of Physical Chemistry, School of Chemistry, Aristotle University of Thessaloniki, Thessaloniki, Greece

(*ikartson@chem.auth.gr*)

ABSTRACT

The vision of materials that perpetually maintain their **integrity** is driving significant innovation in materials science. The concept of **intelligence** has many applications, such as self-repaired materials, machine learning and cyber security. Smart coatings have the ability to sense, response to several cycles and interact with their environment. Properties that are affected by either momentary or continuous external stimuli in smart coatings can be related to corrosion, fouling, fungal, self-healing, piezoelectric, microbiological, etc. This seminar will explore the frontier of **self-healing materials**, focusing on emerging concepts and future research directions. We will discuss advanced healing mechanisms that draw inspiration from biological systems, such as multi-stimuli responsive healing, hierarchical healing, and the development of self-healing systems for extreme environments. Topics will include the investigation of successful implementations and ongoing research in areas such as **protective coatings** with autonomous repair capabilities for corrosion prevention, the role of nanotechnology in enhancing healing efficiency, and the potential for materials that not only self-heal but also adapt and self-regulate. This seminar is aimed at researchers, academics, and students interested in the fundamental science and engineering challenges that need to be overcome to realize a truly **self-repairing world**.