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# SURFACE ENGINEERING FOR SUSTAINABLE FUTURE: MULTIFUNCTIONAL COATINGS FOR OPTICS, ENERGY, AEROSPACE AND MANUFACTURING APPLICATIONS

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Surface engineering approaches, especially those involving low pressure plasma processing, allow one to develop new and highly efficient solutions for advanced application in the areas of optics, energy, aerospace, manufacturing, biomedical and others. Besides their primary function, the film and coating systems face increased technological, environmental and economic challenges, especially since the performance of modern equipment and components is pushed to and beyond their limits. Frequently, the primary functional and multifunctional characteristics of the coating systems are limited by materials deterioration accelerated in hostile environments involving excessive wear, erosion, corrosion, and other mechanisms related to the surface damage, resulting in increased operation costs, decreased efficiency, and premature failure.

In depth understanding of materials primary functional characteristics, their design and fabrication, as well as of the deterioration processes helps to develop appropriate strategies to increase durability, while taking into account the complete life cycle of the device or component.

This presentation will illustrate the performance of coatings developed for different sectors of application by specific case studies representing various coating microstructures, architectures and new and novel fabrication methods. This includes: (a) High Power Impulse Magnetron Sputtering (HiPIMS) for optical coatings in architectural glazing for smart eco-energetic windows; b) Ion Beam Assisted Chemical Vapor Deposition (IBA-CVD) of hybrid organic-inorganic optical coatings for advanced ophthalmic lenses, (c) Pulsed hollow cathode PECVD coatings for high erosion resistance inside narrow tubes and cavities, and (d) Importance of the optical properties of thermal barrier coatings in new-generation aircraft engines.