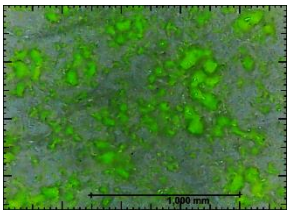
Consiglio Nazionale delle Ricerche

Istituto di Chimica e della Materia Condensata e di Tecnologie per l'Energia

ICMATE

Plasma Electrolytic Oxidation (PEO) as process of functionalization of metallic surfaces

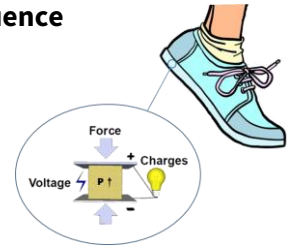


The Plasma Electrolytic Oxidation treatment (PEO, sometimes also called MAO, Micro Arc Oxidation) has recently attracted great attention due to its capability to create a thick and adherent coating with excellent corrosion and wear resistance. Some of the main characteristics of PEO coatings are the high mechanical and corrosion performances, also compared with hard anodizing, and the possibility to incorporate directly into the coating particles and compounds that are dispersed or dissolved into the electrolyte. This last characteristic is particularly useful since permits an easy functionalization of the coated surfaces by inserting particular compounds in the employed electrolytes. The present seminar wants to give a brief overview of the results related to the production and characterization of PEO coated metallic samples obtained by inserting metallic and non-metallic particles or other compounds into the coating

Ing. Luca Pezzato, researcher at CNR-ICMATE in Padova, master degree and Ph.D. in Materials Engineering at the University of Padova (Italy). His main research interests are related to the metallurgy field. In detail main research topics were the production and characterization of Plasma Electrolytic Oxidation (PEO) coatings on light alloys, the study of the corrosion properties of steels and stainless steels, the microstructural characterization of advanced high strength steels, the development of innovative membranes for hydrogen purification and the recovery of metals from end-of-life PV Panels.

The influence of preparation methods on the properties of flexible piezoelectric composite films

Energy-autonomous systems that utilize smart materials have the potential to significantly reduce fossil fuel consumption. Among these materials, those with piezoelectric properties are especially promising for integration into energy harvesting and conversion devices. Polymer-based composites with functional ceramic fillers are attracting considerable attention due to their ability to combine the inherent flexibility and high breakdown strength (BDS) of polymers with the functional properties of embedded inorganic particles. Building on encouraging previous findings, this study presents a comparative analysis of piezoelectric materials, focusing on the mechanical, thermal, chemical, and electrical properties of flexible PVDF/$BaTiO_3$ composite films prepared using different techniques. We explored the impact of processing on particle dispersion and filler-matrix interactions, particularly regarding agglomeration phenomena and selective formation of PVDF polymorphs. Finally, we examined how these factors influence the dielectric and piezoelectric response of the ensuing composites.



Dr. Marco Fortunato Researcher at CNR-ICMATE in Genova, MSc in Chemical Sciences, PhD in Sciences and Technologies of Chemistry and Materials. His research is focused on the synthesis of ceramics powders and their application as fillers in polymer-based composites for energy storage and harvesting.

RAISE

Webinar *MATERIALS MATTER!*

Dr. Luca Pezzato, ICMATE Padova
Dr. Marco Fortunato, ICMATE Genova

16 April 2025 h 3.00-4.00 pm

Participation LINK

NET4Air

Funded by the European Union