E-MRS 2011
Spring Meeting

Bilateral Energy Conference
Acropolis Congress Center
Nice, France

May 9 – 13, 2011

ICAM

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Spring 11 K: Protective coatings and thin films

This symposium will address the current scientific and technological advances in the field of protective coatings and thin films. For 2011, highlights will focus on advanced surface engineering processes and deposition methods used for the synthesis of multifunctional nanostructured thin films. Particular emphasis will be placed on thin film development and emerging applications related to mechanical, energy and biological fields.

Scope:

In parallel to the development of thin film deposition processes, new materials with enhanced properties are nowadays available by appropriate design of their structures at the nanoscale including single phase, alloyed or heterostructures (layered or nanocomposite) coatings. New methods are thus required to better control the elaboration processes and to characterize these nanostructured materials in order to understand their practical performance.

The aim of this symposium is to offer an overview of this disciplinary field and a forum for the interchange of information and expertise on the cutting edge research, advanced technology and applications of protective coatings and thin films. Areas of particular interest will include, but will not be limited to, the following topics:

- Materials organized at the nanoscale, single phase or multicomponent systems organized in the form of alloyed, nanolayered, nanomposites or nanostructured coatings with a wide range of applications (energy, medical implants, mechanical engineering, automotive, aerospace, displays, inkjet printing, decoration, etc.). Correlation of basic properties and microstructure of these functional coatings with the final performance in selected applications.
- New deposition processes, either chemically assisted, like PECVD at atmospheric pressure, "localized" CVD deposition, or physically assisted such as highly ionized sputter deposition or ion enhanced pulsed laser deposition, evaporation, spraying, cathodic arc, plasma-based ion implantation, or even coupling these two assistances like hybrid PVD/CVD techniques.
- Advanced methods including basic understanding of deposition processes, new surface and volume diagnostics, numerical approaches together with multi-scale models.
- Characterization and properties of protective coatings, including morphology, microstructure, composition, adhesion, mechanical properties (superhardness, high ductility, friction, wear, lubrication...), corrosion resistance, chemical properties, UV resistance, anti-smog, anti-microbial or self-cleaning finalities, etc.

17:30	**Electrical properties of AlNxOy thin films deposited by DC magnetron sputtering** **Authors :** J. Borges (Centre/department of Physics, University of Minho, Campus de Gualtar,4710-057 Braga, Portugal); R. Arvinte (Centre/department of Physics, University of Minho, Campus de Gualtar,4710-057 Braga, Portugal); Marta M. D. Ramos (Centre/department of Physics, University of Minho, Campus de Gualtar,4710-057 Braga, Portugal); N. Martin (Institut FEMTO-ST, Département MN2S, UMR 6174 (CNRS, UFC, ENSMM, UTBM) 32, Avenue de l'Observatoire, 25044 BESANCON Cedex, FRANCE; F. Vaz (Centre/department of Physics, University of Minho, Campus de Gualtar,4710-057 Braga, Portugal); L. Marques (Centre/department of Physics, University of Minho, Campus de Gualtar,4710-057 Braga, Portugal) **Resume :** Al2O3 is an insulator material, with high electrical breakdown and large band gap. Its dielectric properties make it a candidate to be used as gate material instead of SiO2 in microelectronic applications, such as in flash memory circuits. On the other hand, AlN is a ceramic piezoelectric material with high electrical resistivity and excellent thermal properties, which has been used in several applications such as substrate in microelectronic and SAW devices, and in packaging. Combining both materials in the form of an oxynitride, offers the possibility to synthesize a mixed system, in which several properties may be optimized, namely those related with the electrical response of the material. The present work aims to study the variation of the electrical response of the AlNxOy thin films as a function of the composition of the prepared films, using as reference the two base binary systems: AlNx and AlOy. The electrical resistivity of the films was found to depend strongly on film stoichiometry and structure. Furthermore, the electrical conductivity of the films measured as a function of the temperature changed gradually from metallic to semiconducting, which was correlated with the increase of the non-metallic/metallic ratio and the particular structural features that were observed by the XRD measurements. The overall set of results confirmed a smooth transition of the film's electrical characteristics between those of closely metallic, towards those of AlN and Al2O3 films.	9 19