

Low pressure plasma deposition of nanotextured metal and metal oxide thin films for catalytic applications

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Nanotextured metal and metal oxide thin films are of interest for an increasing number of catalytic applications ranging from fuel cells to photoelectrochemical water splitting, from photochemical wastewater treatment to biodiesel production. The need for enhanced performance and versatility has correspondingly stimulated the development of thin film materials combining suitable chemistry and morphology.

In this talk, we will present some examples of catalytic layers developed in our laboratory. In the context of fuel cells, a single-step process combining Plasma Enhanced- Chemical Vapour Deposition (PE-CVD) of hydrocarbons or fluorocarbons and RF sputtering of platinum, is used to obtain nanocomposite polymer/metal films with controlled dispersion of catalyst nanoparticles. The versatility, as well as, the limitation of such process in terms of catalyst performance will be discussed.

Our recent work focuses on the sputter deposition of nanotextured iron oxide thin films as catalysts for photoelectrochemical water splitting. A complete chemical, structural, morphological, optical and photoelectrochemical characterization will be presented. Finally, we will also explore the use of such metal oxide films as catalyst for photochemical wastewater treatment and for biodiesel production.