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CATALYTIC NANOMATERIALS FOR FUEL CELL BY MAGNETRON SPUTTERING

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Improving the core of a Proton Exchange Membrane Fuel Cell is a very challenging task which requires new materials and new related synthesis processes. Among many methods, plasma deposition is a promising technique for manufacturing these fuel cell materials. Various materials have been designed at a sub-*micrometric level* using plasma deposition techniques in order to optimise the geometry of the thin catalytic layer at the electrode/membrane interface. The manufacturing of Pt nano-catalysts and Pt-C nanowires through the use of magnetron sputtering deposition allowed us to improve the fuel cell electrical performance operating in H_2/O_2 while reducing the amount of platinum [1,2]. High Power Impulse Magnetron Sputtering (HiPIMS) has been used to enhance the penetration of Pt nanoclusters inside microporous carbon supports [3]. The association of these Pt nano-catalysts with polymeric micro-patterns performed by laser [4], plasma irradiation and micro-molding increased the power density delivered by the fuel cell while simplifying its architecture. More recently, plasma techniques were employed to design nanoclusters to the *atomic level*. Efficient fuel cell electrode containing monoatomic, bimetallic and trimetallic Pt-based nanoclusters [5] has been synthesized by magnetron co-deposition and gas-condensation technique.

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