Title: **Synthesis and characterization of Pd(Cu) electrocatalysts for the oxygen reduction reaction in Polymer Electrolyte Fuel Cells (PEFCs)**

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As a result of the big energy demand and the environmental awareness that is being achieved nowadays, the search for renewable energy sources is on the rise. Between the possibilities, hydrogen-based fuel cells present a promising future, mostly on motoring applications, as batteries for electric cars. However, they need the use of catalysts to solve kinetic problems, thereby making them economically less viable. At present, Platinum catalysts, an expensive and scarce element, are currently used. The study carried out during this project, at the Laboratory of Electrochemistry of Materials and the Environment (LEMMA) research group, from the University of Barcelona, has been based on the Platinum substitution by another noble metal, Palladium, very similar in properties terms and less scarce. The electrocatalysts studied had been based on a core-shell structure, using Copper for the core. That structure permits a cost reduction, apart from a better use of Palladium. Catalysts have been placed on a carbonaceous support, in order to increase the nanoparticles dispersion. The synthesis has been performed in two steps, starting with the Cu deposition on the support using reduction, and the following formation of the Pd shell. It has been made two samples of Pd(Cu)/XC72R, changing the galvanic exchange time, and another of Pd(Cu)/MWCNT. The characterization has been carried out using transition electron microscopy (TEM) and X-ray diffraction (XRD) techniques. Additionally, it has been electrochemically characterized by cyclic voltammetry. Due to the current situation, the study could not be done in its entirety. Therefore, it has only been possible to determine that, prolonging the galvanic exchange time during the synthesis, produces a positive effect, because it is obtained a better Pd covering and the catalysts present less agglomeration.

Keywords: low-temperature fuel cells, core-shell catalysts, Pd(Cu), oxygen reduction reaction, cyclic voltammetry, CO oxidation.