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Synthesis of Pt based catalyst by a novel plasma deposition methodMathilde LAURENT-BROCQ¹, Nathalie Job², Jean-Jacques Pireaux¹¹LISE - Namur University, Namur, Belgium ²Laboratoire de Génie Chimique – Génie Catalytique, Liège University, Liège, Belgium

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A novel low temperature plasma method using organometallic precursors was recently developed to graft metallic nanoparticles on various powder supports [1]. Very fast, operating at low or ambient temperature, this original “one pot” physical method is extremely simple, not requiring any pre- or post-treatment. Here it is applied to the synthesis of catalysts – platinum nanoparticles supported on carbon black, for Polymer Electrolyte Membrane fuel cells. One major challenge for the commercial spreading of fuel cells is to reduce the cost, for example by decreasing Pt loading in the catalyst. To do so while keeping the same catalytic properties, size and dispersion of Pt nanoparticles onto the carbon support need to be better controlled [2].

The objective of this study is to determine the influence of synthesis conditions on Pt nanoparticles characteristics. So, catalysts were synthesized under various plasma treatment conditions (gas, power and pressure) and then characterized by X-ray diffraction, transmission electron microscopy and X-ray photoelectron spectroscopy. It is shown that to form Pt nanoparticles it is needed to functionalize the carbon support and to decompose the organometallic precursor. Gas, power and pressure of the plasma have distinct influences on those two requirements.

References:

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[2] H.A. Gasteiger, S.S. Kocha, B. Sompalli, F.T. Wagner, Appl. Catal. B 56 (2005) 9.

Keywords

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