CARBON BLACK FUNCTIONALIZED WITH SULPHONIC GROUPS AND ITS USE AS ELECTROCATALYSTS SUPPORT FOR FUEL CELL APPLICATIONS

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The development of electrocatalysts that may present better performance for H_2 oxidation, as well for methanol oxidation must consider the determination of which are the best physical and chemical conditions of these support surfaces[1]. In this specific case, we aim to the functionalization[2] of the carbon surface, introducing sulphonic functional groups allowing the interaction with metallic catalysts particles, modifying its properties, hindering posterior agglomeration and loss of active surface. It is also expected the enhancement of the proton transference in the triple catalyst interface for the functionalized carbon support. The PtRu/C electrocatalysts systems were prepared by impregnation method and direct reduction with ethylene glycol. For the MEA's (membrane electrode assembly) production and fuel cell tests was used the spray-drying technique. The physical characterizations of the materials were carried with Boehm titration method, laser scattering, thermo gravimetric analysis, x-ray diffraction and energy dispersive of x-ray spectroscopy. The electrochemical characterization was performed using the porous layer electrode technique, through cyclic voltametry technique and linear sweep voltametry for methanol oxidation. The materials were finally tested for PEMFC working with H_2/O_2, and for DMFC working with methanol/O_2. The electrocatalysts preliminary tests using the linear sweep voltammetry for methanol oxidation showed that the material functionalized with sulphonic groups presents greater current density for methanol oxidation, consequently better performance. For the fuel cell results, in summary, it presented the following performance order: PtRu/C-SO_3 > PtRu/C > PtRu/C ETEK.

Keywords: carbon black, functionalization, sulphonic groups, solid acid, electrocatalysts, fuel cell, PEMFC, DMFC

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