SYNTHESIS AND CHARACTERIZATION OF Pd AND Nb ELECTROCATALYSTS SUPPORTED ON CARBON XEROGEL DERIVED THE TANNIN FORMALDEHYDE SYSTEM AND ON VULCAN® XC72R CARBON BLACK

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The present work deals with the development of Pd (palladium) and Nb (niobium) electrocatalysts, reduced via the reduction technique by sodium boron hydride, on carbonaceous supports, namely Vulcan® XC72R carbon black, commonly used as catalytic support,and carbon xerogel (CX) derived the tannin-formaldehyde system. Tannin is an organic, renewable source material and a cheap carbon precursor. The objective is to apply the electrocatalysts developed as the anode in a fuel cell of the ADEFC type (Alkaline Direct Ethanol Fuel Cell). For all the developed electrocatalysts, the SEM-FEG images indicate that the catalytic supports did not have their structure modified after the electrocatalyst synthesis process,and via TEM it is possible to observe the metallic distribution on the surface of the electrocatalysts as well as the interaction between the metals and carbonaceous catalytic supports. The surface area exposed to the reaction o fall electrocatalysts was analyzed via N_2 physisorption. By Ramanspectroscopy, all materials showed a D band around 1340 cm^{-1},indicating a disordered structure, which could be confirmed by the Id/Ig ratio,on average 1.3 for electrocatalysts supported on CX, and 2.3 for electrocatalysts supported on Vulcan®XC72R. By XRD, in addition to the analysis of the diffractograms presented by the electrocatalysts under study, the size of the crystallite was also calculated via the Debye-Scherrer equation, taking into account the peak of Pd (111), at approximately 2θ = 40.2, and crystallites of, on average, 8.1nm. The size of the crystallite is related to the way in which the particles are dispersed on the surface of the support. In turn, the metallic dispersion is strongly linked to the performance of the material in the final application, the greater the dispersion, the greater the energy efficiency of the material. The presented results demonstrate that the control of the final properties of a certain material is intimately linked to the synthesis control.The results also demonstrate the synthesis control potential, and chemical and physical properties of the CX catalytic support, and consequently of the electrocatalysts supported on this catalytic support.

Keywords: Electrocatalysts, Palladium, Niobium

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