STUDY OF THE SURFACE OF Pd AND Nb ELECTROCATALYSTS SUPPORTED ON CARBON XEROGEL AND VULCAN®XC72R VIA XPS

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The present research focuses on carrying out a chemical analysis of the surface of Pd (palladium) and Nb (niobium) electrocatalysts using the X-Ray photoelectric spectroscopy (XPS) technique, also called ESCA (Electron Spectroscopy for Chemical Analysis). The electrocatalysts in the studies are supported on VULCAN®XC72R carbon black and carbon xerogel. The carbon xerogel used in this work was synthesized the tannin-formaldehyde system, with tannin being the carbon precursor in this process. Tannin is a material of natural origin, cheap and renewable. In the studied samples, the Nb 3d signal is attributed to two doublets, Nb $3d_{5/2}$ at approximately 209.58 eV, and Nb $3d_{3/2}$ at approximately 206.98 eV. Both doublets are attributed to Nb oxide (Nb_2O_5).The Pd 3d signal can be attributed to two doublets: at approximately 340.48 eV for Pd $3d_{3/2}$, and at approximately 335 eV for Pd $3d_{5/2}$. Both doublets refer to Pd^0. Specifically in the electrocatalysts supported on carbon xerogel, the following doublets appear at lower intensities: at approximately 342.98 eV and 337.58 eV referring to PdO_2; and at 341.78 eV and 336.58 eV referring to PdO, while for electrocatalysts supported on VULCAN® XC72R these doublets appear at higher intensities. Such behavior can be caused by the strong electronic interaction between Pd and Nb. This result is due to the introduction of Nb in the Pd crystalline network, and the possible formation of the PdNb alloy, which from the catalytic point of view can result in a good performance in the electrocatalytic reaction.

Keywords: Catalytic support, Electrocatalysts, XPS

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