INVESTIGATION OF TEMPERATURE EFFECT AND ORR CATALYTIC ACTIVITY Pt- AND PtNi- BASED NANO ELECTROCATALYSTS PREPARED VIA BOENEMANN SYNTHESIS METHOD

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Fuel cell is a device that converts the chemical energy of a fuel and an oxidant into electricity. Proton exchange membrane fuel cells (PEMFCs) take advantage of many aspects due to high power density, low-temperature operation and environmentally friendly technology. Catalyst is a material enhancing the rate of a reaction without being consumed. The catalyst lowers the activation energy required, allowing the reaction to proceed more quickly.

The target of this study is to improve the reaction kinetics, reduce the cathode activation energy and decrease the cost. For these purposes Pt-, and PtNi-supported catalysts were synthesized via Boennemann method. Electrochemical characterization of the synthesized electrocatalysts was carried out rotating disc electrodes in acid media. The results of the electrochemical experiments were investigated related to different temperatures such as 20°C, 35°C and 50°C. Electroactive surface areas and roughness factors were calculated by the cycling voltammograms. Koutecky-Levich analysis made possible to evaluate the kinetic parameters (total number of exchanged electrons, limiting current density, Tafel slope and exchange current density) [1-2]. Particle size distributions and atomic structures of the catalysts were calculated from transmission electron microscopy (TEM) and X-ray diffraction.

Figure 1. Comparison of the specific current density of the Vulcan XC-72 supported Pt- and PtNi-based electrocatalysts in 0,1M HClO₄, 5 mVs⁻¹ and 20°C.

References