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PREPARATION AND CHARACTERIZATION OF Pt NANOCATALYST ON TUNGSTEN BASED SUPPORT FOR ALKALINE FUEL CELLS APPLICATIONS

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Platinum nanocatalyst on tungsten based support has been synthesized and characterized as catalyst for oxygen reduction reaction in 0.1 mol dm^{-3} NaOH solution. Tungsten based support - WxC has been synthesized by modified Ganesan et al. procedure. Synthesized support was characterized by BET, XRD and cyclic voltammetry techniques. Specific surface area of the support determined from nitrogen adsorption/desorption isothermal curves was found to be 177 $m^2 g^{-1}$.

Platinum nanocatalyst at WxC support has been synthesized by borohydride reduction method and characterized by XRD and TEM techniques. It was found homogenous Pt nanoparticles distribution over the support, without pronounced particle agglomeration. Electrochemically active surface area of the catalyst determined from adsorption/desorption charge of hydrogen atoms, after double layer charge substraction, taking into account the reference value of 210 μC cm^{-2} for full coverage with adsorbed hydrogen species, was found to be 40 $m^2 g^{-1}$.

The oxygen reduction reaction at WxC/Pt catalyst has been studied by cyclic voltammetry and linear sweep voltammetry at rotating disc electrode. Single Tafel slope was observed (value of -0.105 mV dec^{-1}), close to the slope at high current densities, for oxygen reduction at pure polycrystalline Pt, as well as at Pt nanoparticles. The specific activities, expressed in terms of kinetic current densities per real surface area at the constant potential, of this new catalyst and Vulcan supported Pt were compared. WxC/Pt catalyst exhibited better catalytic activity for oxygen reduction reaction, as well as better durability comparing with Vulcan/Pt one.