

## Functionalization of Vulcan XC-72 by IMH and its Effect as Support for Pt Electrocatalysts for the EOR

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### ABSTRACT

In this study, Vulcan XC-72 was functionalized by an intermittent microwave heating (IMH) method in two different soft chemical agents, namely citric acid (CA) and methanol (MeOH). The specific surface area and pore structure of the treated carbons were investigated by BET and FTIR studies were achieved to investigate their surface state. The results showed physical and chemical changes in the structure of functionalized Vulcan. Also, Pt/C electrocatalysts were synthesized by pulse-microwave assisted polyol method using the treated carbons as support. The electrochemical activity and stability of the Pt/C materials were investigated by cyclic voltammetry and chronopotentiometry measurements. The electrochemical results showed higher catalytic activity and stability for Pt nanocatalyst supported on some of the functionalized carbons for the Ethanol Oxidation Reaction (EOR) compared to a Pt/C electrocatalysts dispersed on unmodified Vulcan. The higher performance of Pt/C electrocatalysts on functionalized supports may be due to: i) a better distribution of the nanoparticles, and ii) an enhanced interaction between Pt nanoparticles and the oxygenated species present on the surface of the treated carbon. The results showed in this work suggest that functionalization of Vulcan with MeOH and CA using the IMH method is a promising process for the development of highly active Pt/C catalyst toward the EOR due to its simplicity and low cost.

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*Keywords:* functionalization of Vulcan; citric acid and methanol; EOR

