

“Platinum Electrodeposition on H-ZSM-5/ Vulcan XC-72R using a Rotating Disk-Slurry Electrode Technique for Oxidation of Methanol in Alkaline Medium”

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Abstract: Platinum was electrodeposited onto H-ZSM-5/Vulcan XC-72R to produce Pt/H-ZSM-5/V catalysts using a Rotating Disk Slurry Electrode (RoDSE) technique. Well-defined nanometer sized Pt clusters were formed within the ZSM-5 host. The pores of zeolites containing the Pt clusters were also filled with electrically conductive carbon (Vulcan XC-72R). The activity of the catalysts was measured towards methanol electro-oxidation in alkaline media by cyclic voltammetry and chronoamperometry. The resulted nanostructure Pt/H-ZSM-5/V exhibited much enhances towards methanol electro-oxidation compared with commercial 40% Pt/C catalyst. Methanol oxidation at Pt/H-ZSM-5/V was governed by diffusion control also the latter exhibited remarkable preferential CO oxidation. Furthermore, CO stripping demonstrated that nanoparticles of Pt have much higher long-term catalytic stability and CO resistance than commercial Pt/C catalyst. High Electrocatalytic activity of Pt/H-ZSM-5/V can be attributed to the synergistic contribution provided by highly dispersed Pt nanoparticles and the Brønsted acidity of the high surface area of H-ZSM-5. The material was examined using Scanning Electron Microscopy (SEM), X-ray Diffraction (XRD), X-ray Photo Spectroscopy (XPS) and Thermogravimetry Analysis (TGA).

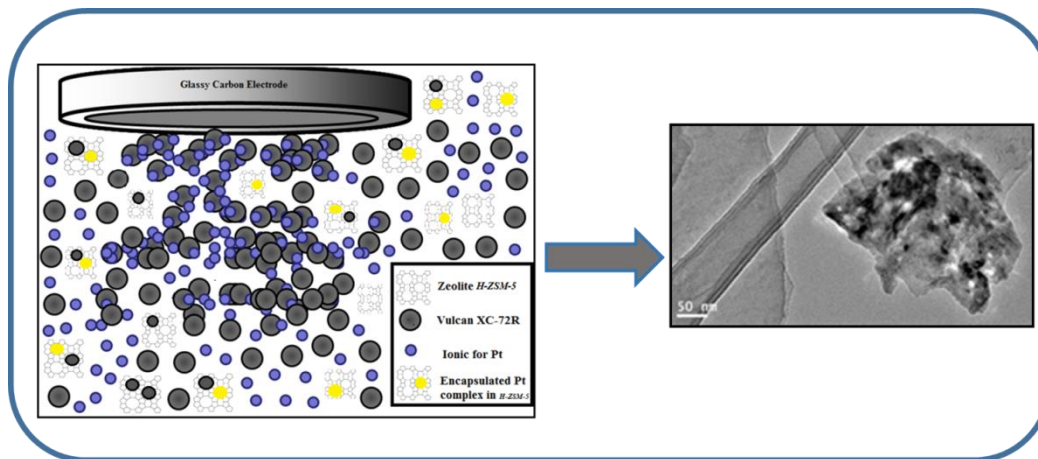


Figure 1. Illustration of the Rotating Disk Electrode technique (RoDSE) for the synthesis of nanoparticles of Pt/H-ZSM-5/Vulcan XC-72R.