

Review On Characterization of Heterogeneous Catalysts: Influence of Particle Size and Pore Size Distribution on Environmental and Automotive Applications

Fatema Salim Merchant¹, Satish R Ingal², Ruchi Dubey³, Mohammad Sajid Mansoori⁴

^{1,2,4}Department of Chemistry,

Shri Vile Parle Kelavni Mandal's, Mithibai College of Arts, Chauhan Institute of Science & Amrutbet Jivanlal College of Commerce & Economics (Autonomous), Mumbai, Maharashtra, India.

³Thakur college of Science and Commerce, Mumbai 56, Maharashtra, India.

*Corresponding author (e-mail: mohd.mansoori@mithibai.ac.in)

Abstract: *Heterogeneous catalysts are important parts of many types of environmental technology employed today, specifically in automotive after treatment for exhaust systems including Diesel Particulate Filters (DPF), and advanced emission control devices. The catalytic efficiency, durability and long-term stability of these catalytic systems are controlled by specific physicochemical characteristics, that have a strong effect on the development of performance characteristics for catalytic systems over the last few decades have been accomplished using both empirical and theoretical studies that show how these structural characteristics contribute to the promotion catalytic activity, the amount and mobility of oxygen through a catalyst, the degree of difficulty for Mass Transport to occur in a carbon-metal-oxide hybrid structure, thermal stability in different temperatures, the resistance of soot due to high-temperature sintering, and the methods of deactivation.*

In this review I have present an integrated and detailed overview of over 31 of the most significant research studies in the area of structure performance relationship for heterogeneous catalysts that have been used for environmental and automotive applications. An essential aspect of this work will focus on the Soot Oxidation catalyst, DPF, 3-Way Catalysts (TWC), fuel cell related Catalyst Layers, and Nanostructured Porous materials. Also discussed in this review will be a critical evaluation of the currently employed characterisation techniques (Gas Physisorption, Chemisorption, Scanning Electron Microscopy, X-Ray Diffraction and Particle Size Analysis) as they relate to the catalytic performance associated with those catalysts.

Keywords: operating continuously in industrial processes; environmentally friendly; Diesel Particulate Filters; Three-Way Catalysts; Heterogeneous Catalysts; Environmental Catalysts; Nanostructured Catalysts; the effects of Pore Size; Surface Area on Particle Size can be found

