FOR NOTICE BOARD

INDIAN INSTITUTE OF SCIENCE

INSTITUTE COLLOQUIUM

(Chemical Sciences)

Prof. M. S. Hegde

Solid State and Structural Chemistry Unit

will deliver a lecture

on

Developing Catalysts for Specific Reactions: A Fascinating Journey through Solids and Surfaces

on Monday, November 26, 2007
at 4.00 pm in the Faculty Hall

THE DIRECTOR
will preside

All are cordially invited

Coffee/Tea: 5.00 pm
Venue: Reception Hall

Abstract

Rational design and development of catalysts for specific reactions require an understanding of surface chemistry and solid state chemistry. Chemistry on solid surfaces is a branch of surface science involving determination of electronic structure of a solid surface and the molecules

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adsorbed on the solid. Catalysis is a branch of chemistry where molecules interact with solid surfaces to give specific products. In this lecture, we will show how a new catalyst can be developed based on the understanding of solid state chemistry and surface chemistry.

Electron states of atoms, molecules and solid surfaces are determined here employing home built photoelectron spectrometers. Redox properties of oxides are routinely determined by TPD and TPR systems developed here. Noble metal ionic catalysts are introduced by us to the literature as against metal nano-particles. Conversion of carbon monoxide, hydrocarbons and NOx from AUTO-EXHAUST occur with our ionic catalysts at 100 ^{0}C compared to commercial noble metal catalysts working at about 400^{0}C. Origin of catalysis concepts such as Oxygen Storage Capacity, Metal-Support interaction, Hydrogen Spillover has been identified. Handling of nano-catalyst powders is avoided by a new method of direct coating of nano-catalysts on honeycomb converters and the process is being commercialized. Ability to fabricate complex instruments has resulted in the development of fuel efficient wood burning ASTRA STOVES which are in use for 25 years. We will show how the basic research carried out in the laboratory can be implemented to specific applications.
