

Nanostructured Materials in Heterogeneous Catalysis

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Nanostructured materials are materials engineered with atomic accuracy. Nanostructured materials include atomic clusters, layered (lamellar) films, filamentary structures, and bulk nanostructured materials. The common thread to these materials is the nanoscale dimensionality, i.e., at least one dimension less than 100 nm, more typically less than 50 nm. The different, often superior, properties that can occur are the driving force behind the explosion in research interest in these materials. For instance, Au is inert metal, but Au clusters or nanoparticles are catalytic active. Nanocarbon (carbon nanotube, onion-like carbon, ultra-fine disperse diamond) are highly active in oxidative dehydrogenation of ethylbenzene to styrene due to its high edge to basal carbon atom ratio, compared with carbon black and graphite. In this presentation, the definition of nanostructured materials, their properties and synthesis are reviewed. The requirements of heterogeneous catalysis on nanostructured materials are discussed.