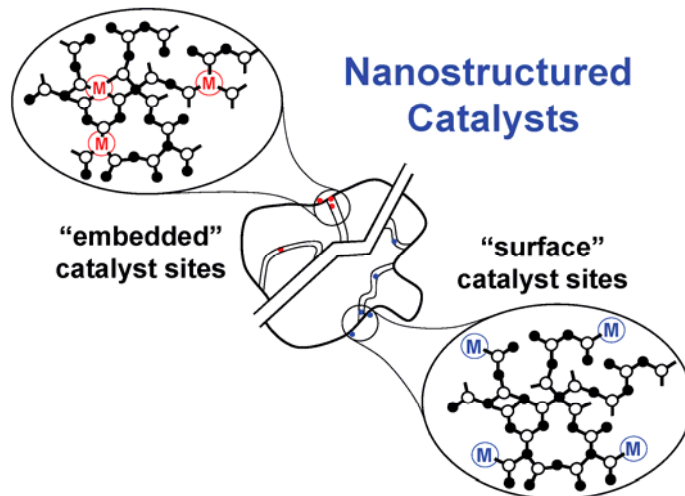


Dr. Craig Barnes  
University of Tennessee



The Design, Synthesis and Reactivity of Nanostructured Metal Oxide Catalysts – Where  
Materials Science meets Catalysis

Nanostructured heterogeneous catalysts may be defined as materials in which the form and structure of the catalyst-support matrix are designed and simultaneously controlled at several different length scales. At the level of the active site itself, nanostructuring requires that we be able to identify and target specific arrangements of metals and ligands such that a desired catalyst “ensemble” is obtained and all other potential metal species excluded (the definition of a single site catalyst). In the context of metals on the surfaces of metal oxide supports, some tailoring of the surface functionality that both holds them in place and contributes to the sphere of coordinating ligands must take place as the catalyst ensemble is developed. Catalytic activity is directly proportional to the number of accessible sites in the system. Therefore, a second goal in developing nanostructured catalysts is to achieve the highest density of sites possible within the support matrix while maintaining site isolation. Finally, all sites must be accessible and mass transfer rates should be as high as possible. An operational target satisfying this goal is to achieve a distribution of meso and microporosity throughout the solid analogous to vascular systems found in plants and animals.

Such “next generation” catalysts will require entirely new synthetic approaches than are currently available. Our efforts to articulate a general methodology for the preparation of single site, nanostructured catalysts based upon a silicate building block and a wide variety of metal and main group linking reagents will be described. Specific examples involving Ti, V, Al and Sn will be discussed.

When Tuesday November 3, 2009  
12:30 – 1:30  
Where Hamblin Hall 107  
Refreshments will be served

Students who wish to meet with Dr. Barnes to talk to him about graduate school or his research can meet with him informally at 1:30 in the Conference room or contact Dr. Fultz for a scheduled conference with him.