# CHEMICAL, BIOLOGICAL & MATERIALS ENGINEERING

**100 E. Boyd, Sarkeys Energy Center, T-301**
**405-325-5811**
**The University of Oklahoma**
**Norman, Oklahoma**

**2014 – 2015 Seminar Series**

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## DR. FRANKLIN FENG TAO

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DEPARTMENT OF CHEMICAL AND PETROLEUM ENGINEERING
DEPARTMENT OF CHEMISTRY
UNIVERSITY OF KANSAS
LAWRENCE, KANSAS

Will present a seminar on

## "SYNTHESIS AND CATALYSIS OF ISOLATED BIMETALLIC SITES FOR CHEMICAL TRANSFORMATIONS"

In heterogeneous catalysis, a single catalytic event is typically performed on a catalytic site consisting of a couple of or a few atoms of metal, oxide, carbide, or their support. Electronic state of atoms of a catalytic site is the key factor determining its catalytic performance since it dominates the fundamental surface process in a catalytic cycle including adsorption and dissociation of reactant molecules, surface diffusion of reactant molecules or dissociated species, coupling between different reactant molecules or dissociated species, adsorption of intermediates, and desorption of product molecules. Tailoring electronic state of a catalyst at atomic or nano scale for tuning a catalytic performance has been applied to the development of a catalyst with higher catalytic activity and selectivity.

One important category of heterogeneous catalysts is bimetallic catalyst M-A (M and A denotes metal elements) which consists of continuous bimetallic sites at a metallic state. The second metal A could tune catalytic performance of the first metal M through electronic, geometric, bi-functional, or lattice strain effects compared to a monometallic catalyst. Single dispersion of such bimetallic sites through separately anchoring them on a non-metallic support can offer a distinctly different catalytic performance in contrast to continuous sites on an alloy nanoparticle (M-A). These isolated bimetallic catalytic sites $M_1A_n$ offer quite high catalytic activity in removal of nitric oxide or production of hydrogen since metal atoms of these isolated bimetallic sites exist at a cationic state instead of a metallic state. In addition, the minimized choice of potential binding configurations of reactant molecules on a single site increases selectivity for production of some product. These studies suggest that formation of singly dispersed bimetallic sites on a non-metallic support is a promising approach to developing catalysts since these isolated sites have an electronic state different from those continuous bimetallic sites on the surface of an alloy nanoparticle.

## THURSDAY, DECEMBER 4, 2014

**COOKIES AND COFFEE -- 1:45 P.M.**

**SEMINAR -- 2:00 P.M.**

**SARKEYS ENERGY CENTER, ROOM M-204**

**THIS IS A REQUIRED SEMINAR FOR CHE 5971**

Accommodations on the basis of disability are available by contacting the office.