

# CATALYSIS SEMINAR SERIES

Sponsored by the Institute for Advanced Materials,  
Devices and Nanotechnology (IAMDN) and The  
Rutgers Energy Institute (REI)

**\*\*\*THURSDAY, April 1, 2010\*\*\***

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**\*\*\*12:00 PM, Room 260**

**Wright-Rieman Chemistry Laboratory**

**Marco J. Castaldi**

**Earth & Environmental Engineering Department (HKSM)**

**Columbia University**

## **Development of Environmentally Benign Energy Technologies**

The confluence of natural and human driven events have shown how acutely sensitive the world, and in particular the United States, is to energy supply and security. Furthermore, if we consider where the world stands today in terms of energy use and where it will be in 100 years, there is a significant challenge to meet the expected demand in a more sustainable way (i.e. CO<sub>2</sub>-neutral, efficient resource utilization, minimization of waste, etc.). Therefore, a primary objective must be to produce energy through the advancement of technologies that use both conventional and alternative sources in the most efficient way. To achieve this goal, a fundamental understanding of the underlying mechanisms and processes is necessary.

This presentation will highlight results from current research in the Combustion and Catalysis Laboratory at Columbia University. It will focus on chemical kinetic and mechanistic investigations of the thermal and catalytic conversion of carbon compounds. For example, aspects of fuel reforming of conventional fuels and conversion of greenhouse gases (CO<sub>2</sub> & CH<sub>4</sub>) to useful chemicals will be detailed. Results from novel reactor systems that avoid equilibrium limitations to gasification processes that incorporate CO<sub>2</sub> as a reactive media that efficiently convert solid fuel such as biomass as municipal solid waste (MSW) to synthesis gas will also be presented. Finally a newly developed technique, adapted from the homogenous kinetic research field, to probe the intrinsic surface kinetic processes of industrially used catalytic reactors at practical operating conditions will be discussed.

**Refreshments at 11:45 am**

**Courtesy of IAMDN and REI**

**Host: Teddy Asefa**