

Weekly Seminar: Fall 2009

Date: December 4

Time: 11:00 AM

Location: Maryland Hall 110

Speaker: Prof. Liejin Guo (Xi'an Jiaotong University, China)

Title: *"Solar-Hydrogen Production by Photocatalytic Water Splitting and Thermochemical Gasification of Biomass in Supercritical Water"*

Abstract

Progress of research programs in solar hydrogen production using photocatalytic water splitting technique as well as the thermochemical gasification of biomass in supercritical water ranging from fundamental to application studies will be reviewed and presented. Among series of systematic research efforts, a compound parabolic concentrator based photocatalytic hydrogen production solar reactor was introduced, demonstrating the feasibility of efficient photocatalytic hydrogen production under direct solar light. Biomass gasification for hydrogen production in supercritical water is a promising technique for high moisture biomass utilization. Compared to traditional gasification processes, supercritical water gasification (SCWG) is suitable for biomass with high moisture content. High energy conversion efficiency can be achieved because of the elimination of the need of a drying process. A hydrogen rich gas with low CO content can be generated in one process step. Tar and char formation can also be suppressed during SCWG. A variety of apparatus for biomass gasification, such as a miniature apparatus with a continuous operational tubing flow reactor, a bench-scale continuous apparatus for co-gasification of coal and biomass, and a novel SCW fluidized bed system for biomass gasification, have been successfully developed. In addition, a comprehensive thermodynamic analysis tool for design and operation optimization of biomass gasification systems has also been developed and tested.

About the speaker: Dr. Liejin Guo is a Chang Jiang Scholar distinguished professor at Xi'an Jiaotong University. He also serves as the dean of the School of Energy and Power Engineering, and the director of the State Key Laboratory of Multiphase Flow in Power Engineering at the same university. He graduated from Xi'an Jiaotong in 1983, 1985 and 1989 respectively with B.S., M.S. and Ph.D. degrees. While authoring or co-authoring over 200 journal papers and book chapters, he has also been holding numerous academic and administrative titles and appointments. He is a recipient of many distinguished academic awards and prizes during his career at Xi'an Jiaotong.