Academic Report

Speaker: Li Fanxing

Assistant Professor

Department of Chemical and Biomolecular Engineering

North Carolina State University

Title: Chemical Looping Strategy and Its Potential for Carbon Negative Energy Conversions

Time： **2:30 (p.m.) May 30, 2011**

Place： **Room 308, IPE Mansion**

Abstract

Energy and global warming are two intertwined issues of critical importance in the modern era. With the pressing need for clean, efficient, and cost effective energy sources, the chemical looping strategy has evolved as a promising alternative to the traditional carbonaceous fuel conversion processes. With the aid of oxygen carrier particles, the chemical looping process efficiently converts carbonaceous fuels while capturing CO2 in an effective manner by looping reaction design. Two unique chemical looping gasification processes, i.e. the Syngas Chemical Looping (SCL) and the Coal/Biomass Direct Chemical Looping (CDCL) processes are being developed and investigated at the Ohio State University (OSU). Unlike other chemical looping processes that are combustion based, the SCL and CDCL processes convert a variety of fuels including coal and biomass into a combination of hydrogen, liquid fuel, and/or electricity. Over the past 6 years, the processes have been advanced from a novel concept to successful sub-pilot (25 kWth) scale demonstrations. A 250 kWth SCL pilot plant is being designed and will be operated at the National

Carbon Capture Center (NCCC).

In this presentation, the various aspects of the chemical looping process development including the composite oxygen carrier particles selection and design, lab, bench, and sub-pilot scale testing, and process optimization and techno-economic analyses will be discussed. The scale-up strategy of the chemical looping technology for commercial use will also be discussed. The ionic transfer mechanism that dictates the oxygen carrier reaction along with several exergetically optimized novel applications of the chemical looping gasification processes will be highlighted. The final portion of the talk is allocated for discussion of the presenter's future research on renewable and fossil energy conversions.

Contact：Prof. Li Songgeng
E-mail: sgli@home.ipe.ac.cn ,　Tel：86-10-82544815