Chemical Engineering Colloquium
Ma Lectureship

April 16, 2025 | 12:00–1:00pm | Goddard Hall, Room 227

Redox Chemical Looping Technology for Clean Energy and Chemical Conversion Systems – Fundamentals and Commercialization

presented by

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The concept of chemical looping reactions in redox operating schemes has been recognized as a valuable means in the synthesis of fuels and chemicals in industries. Fundamental research on chemical looping reactions has also been conducted for many decades. There are presently, however, no chemical looping processes that were demonstrated successfully in commercial operation. Key technical factors that determine commercial viability of the technology lie in the sustainability of the reactivity and recyclability of the metal oxide oxygen carriers and the ability of configuring the reactor assembly for optimal product yields. With CO2 emission control now of great concern and process conversion efficiency enhancement of great interest, activities on research and development of chemical looping technology have resurfaced. This presentation will describe the fundamental and applied features of modern chemical looping technology in the context of the circulating fluidized bed platform that utilizes fossil, biomass and other feedstocks. It will discuss the reaction chemistry, ionic diffusion mechanisms, metal oxide synthesis and thermodynamics, reactor design, and system engineering along with energy conversion efficiency and economics of the chemical looping processes for, specially, partial and selective oxidation for hydrogen, syngas and chemicals production.

Lunch to follow by invitation only

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