



Applying Chemical Engineering Principles to Catalytic Reduction of CO₂

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时 间: 2023-7-5, 10:00 am

地 点: 英士楼201

主办单位: 化学工程系

报告摘要

Converting CO₂ to value-added chemicals and fuels is one of the most practical routes for reducing CO₂ emissions while fossil fuels continue to dominate the energy sector in the near future. In this talk we will present several routes in catalytic CO₂ conversion: (1) CO₂ hydrogenation by thermocatalysis, (2) simultaneous upgrading of CO₂ and shale gas, and (3) CO₂ reduction by electrocatalysis. We will use these examples to highlight the importance of combining experimental studies, *in situ* characterization and density functional theory calculations for the mechanistic understanding of CO₂ conversion. We will use the hydrogenation of CO₂ to methanol as an example to illustrate challenges in achieving a net-reduction of CO₂ by performing mass and energy balance analysis. We will demonstrate the application of chemical engineering principles, including thermodynamics, kinetics and transport, to the catalytic conversion of CO₂. We will also discuss proof-of-principle results of several promising catalytic reactions using tandem processes to convert CO₂ and light alkanes to syngas, olefins, aromatics and oxygenates.

报告人简介

Jingguang Chen is the Thayer Lindsley Professor of Chemical Engineering at Columbia University. He received his bachelor degree from Nanjing University and his PhD degree from the University of Pittsburgh. He is the co-author of 23 United States patents and 480 journal publications, and he is recognized as a Web of Science Highly Cited Researcher. He is currently the President of the North American Catalysis Society and an Associate Editor of ACS Catalysis. He received many awards, including the George Olah Award on Hydrocarbon and Petroleum Chemistry from the American Chemical Society and the Robert Wilhelm Award on Chemical Reaction Engineering from the American Institute of Chemical Engineers.