Status and Plans for catalysis for sustainable energy project

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Seminar at Department of Chemical Engineering, SJTU

- 9 reports, including:
  - Three from NTNU;
  - Three from ECUST, East China University of Science and technology
  - Three from SJTU
- Amongst, in the seminar
  - 3 full Prof.
  - 4 associate Prof.
  - 2 Post-doc
  - 6 PhD students
  - 7 Master students

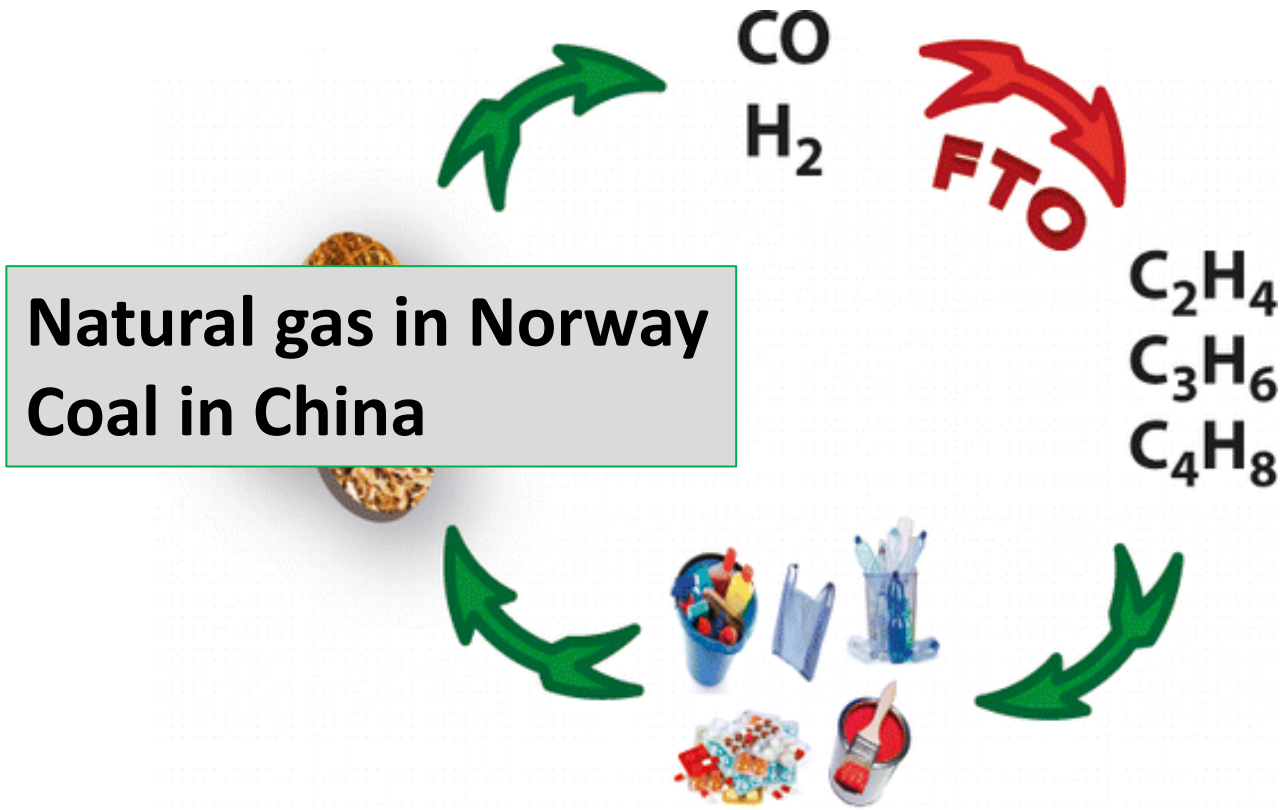
Seminar on Fischer-Tropsch Synthesis from syngas to Olefins (FTO)

Time	Speaker	Institution	Title
Jan. 22, Thursday, Morning Session, Chair: Wen-De Xiao Address: 410 room, Chmistry Building B,			
10:30-11:30	Edd Blekkan	NTNU	Fischer-Tropsch production of light olefins using Co-Mn catalysts
12:00-14:00 Lunch time			
Jan.22, Thursday, Afternoon Session, Chair: Wen-De Xiao Address: 410 room, Chmistry Building B,			
14:00-15:00	De Chen	NTNU	Fischer-Tropsch synthesis on Co-based nanoparticle catalyst
15:00-15:30	Cristian Ledesma Rodriguez	NTNU	Study of the Reaction Network of Fischer-Tropsch Synthesis by Multicomponent Isotopic Transient Methods
15:30-16:00	Di Wang	ECUST	Iron supported on KMnO4 modified carbon nanotubes as catalysts for direct conversion of syngas to lower olefins
16:00-16:30	Xiangping Zhou	ECUST	α-Al_2O_3 nanorods supported Fe catalyst for direct production of lower olefins from syngas
16:30-17:00	Thanh Hai Pham	ECUST	Fischer-Tropsch synthesis on Hagg iron carbide catalysts: A DFT study of the crystal-facet-dependent mechanism
Jan.23, Friday, Morning Session, Chair: De Chen, Address: 518 room, Chmistry Building A,			
9:00-9:30	Yu Wang	SJTU	Hydrothermal preparation of a spinel support for FTO catalyst
9:30-10:00	Xian-Zhi Tang	SJTU	α-Al_2O_3 support manufacturing for industrial application: an case study
10:00-10:30	Wen-De Xiao	SJTU	Search for an more suitable support for FTO catalyst
10:30-11:45	**Discussion for the summary presentation**		

On the education cooperation

- Discussion on possible exchange of students, including the double degree master programe with vice dean of School of Chemistry and Chemical Engineering.

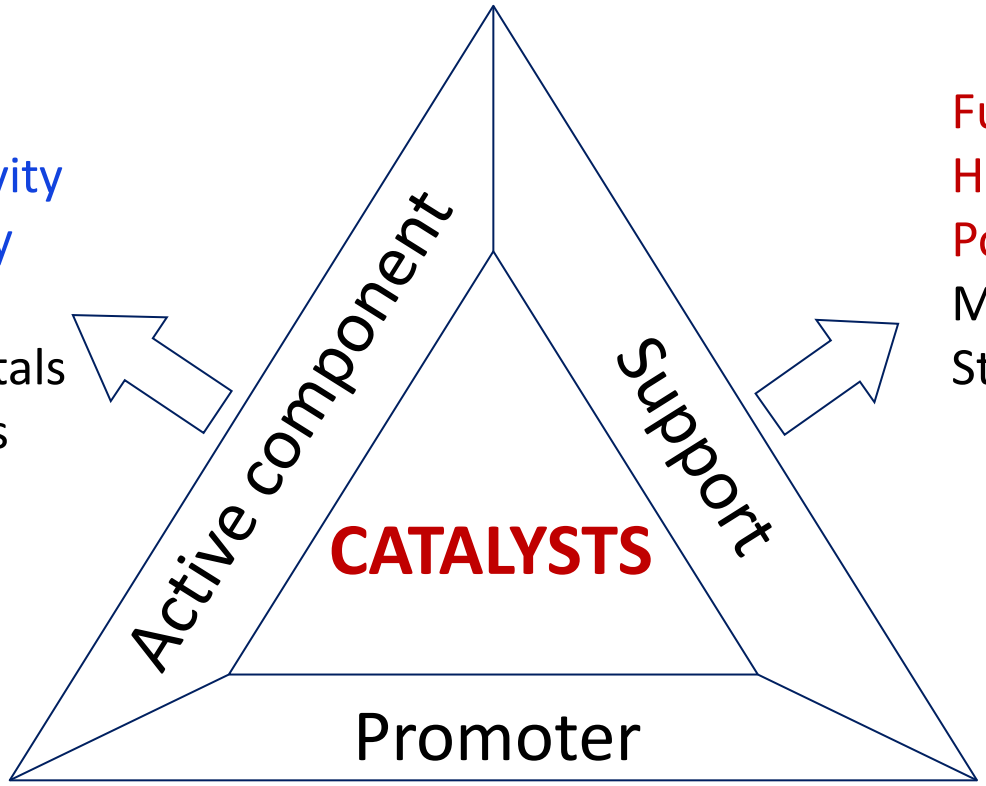
Renewed interests on olefin production by Fischer Tropsch



- Possible to produce olefin via synthesis gas from **natural gas, coal and biomass**

Catalyst is KEY for chemical reaction

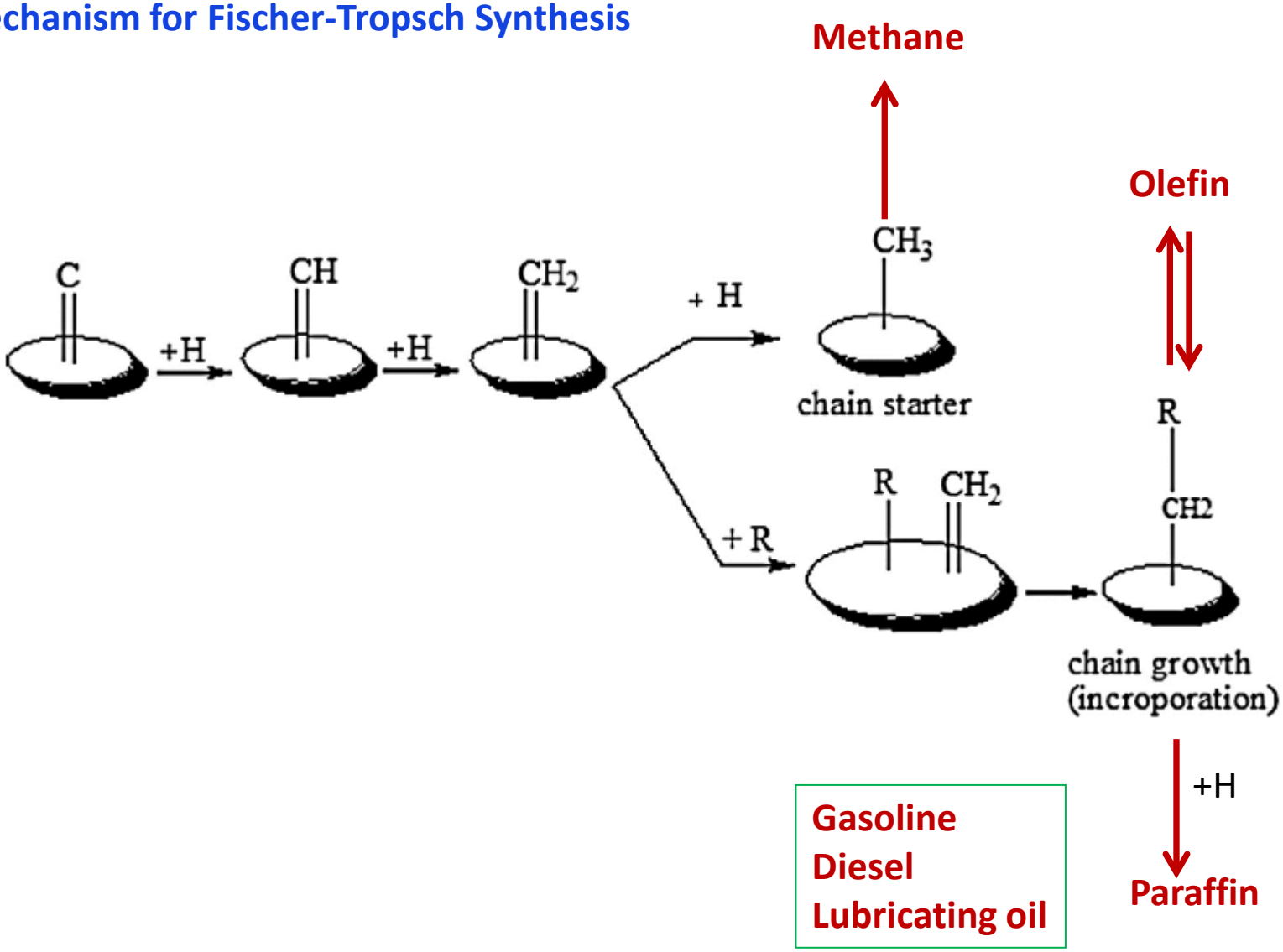
Function:
Chemical activity
Selectivity
Types:
Transition metals
Nano particles



Function:
High surface area
Porosity
Mechanical
Stability

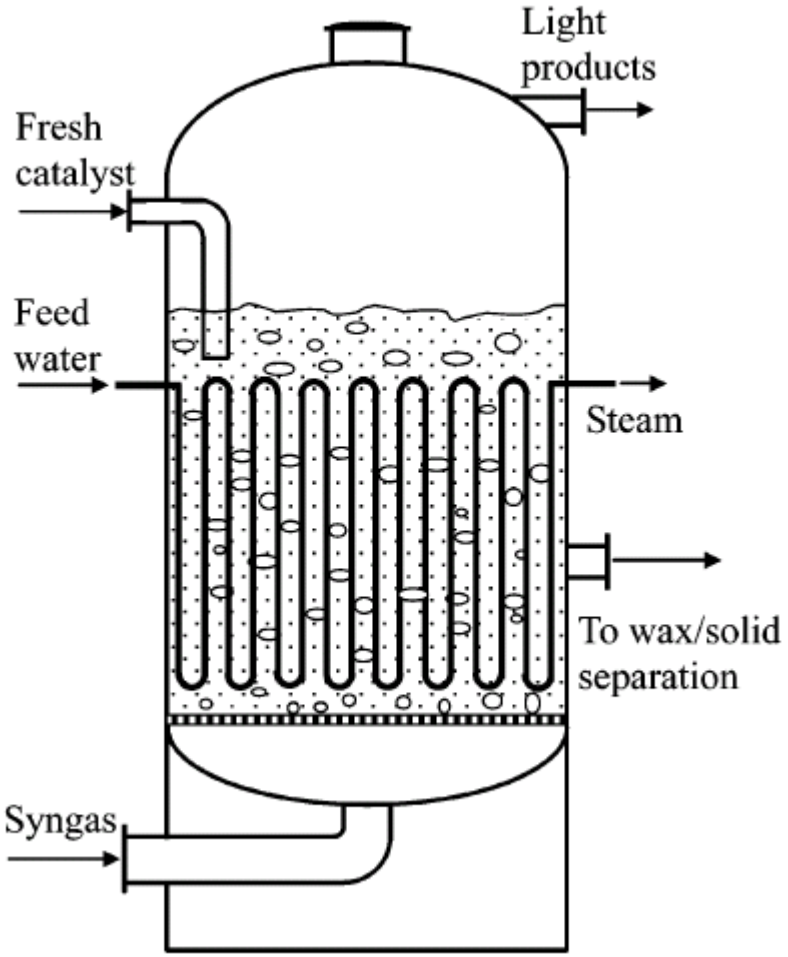
Function: on supports: Structural
Activity inhibition
Activity promotion

One mechanism for Fischer-Tropsch Synthesis



The most clean fuel without any Sulphur

A typical reactor for Fischer-Tropsch Process



The industrial Catalyst:

- **Required for attrition resistance, in the commercial fluidized-bed and slurry reactors**
- **Required for hydrothermal resistance as the products involving water.**
- **Required for a alkali promoter. Fe-K-Cu/Mn**

Fluidized-bed reactor, gas-solid phases, gas-liquid-solid phases

Objectives of the project

- The ultimate goal of the project is to identify the principles for rational design of the catalysts to maximize the C_2-C_4 olefin formation and minimize the methane formation from synthesis, by combining competences from NTNU and SJTU
  - 1) Preparation of Fe and Co and their alloys with well controlled sizes and surface compositions.
  - 2) Correlate chain growth or termination probability to the catalyst properties.
  - 3) Apply the gained scientific insights to optimize the catalysts to maximize C_2-C_4 olefin yield.
  - 4) Enhance the cooperation between SJTU and NTNU by joint projects and personal exchanges

Status of the project, I

- Research team has been formed
  - NTNU: 2 full Prof. + 1 post-doc. + 2 PhDs (1+1)
  - SJTU: 1 full Prof. + 1PhD +1 Master
- Experimental set-up established
  - NTNU: Catalyst activity test, characterization devices, calculation method.
  - SJTU: Catalyst activity test, characterization device

Status of the project II

- Project Plan with highly integrated competences has been discussed:
  - catalyst system and developments
  - Reactor system
  - Fundamental study

Future plan

- Possible new funding
- Possible joint-publications
- Exchange of PhD students
- Participation of industrial partner, like, Jiu-Tai Energy company.

Clarion Hotel The Edge
Tromsø
Norway
5 – 9 June 2016

NGCS 11 Tromsø 2016

The 11th Natural Gas Conversion Symposium

Natural Gas
Conversion Board

Thank you for your attention!