

## Syngas conversion to useful petrochemicals using heterogeneous catalysts

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1, A new, green and general preparation method for bimodal catalysts is developed and applied in slurry-phase Fischer-Tropsch synthesis (FTS), exhibiting very high activity for diesel synthesis from syngas (CO+ H<sub>2</sub>).

2, “Capsule catalyst” concept is invented by the author. A capsule catalyst, with FTS catalyst as a core and H-type zeolite as a shell, can realize one-step synthesis of gasoline (iso-paraffin) from syngas. This is completely different from the conventional FTS reactions producing only diesel. This capsule catalyst concept can be applied in a lot of catalysis reactions or organic reactions such as dimethyl ether (DME) one-step synthesis or epoxide synthesis (ref. 1).

3, A new low-temperature methanol synthesis method (130–170°C, 50bar) is developed using only solid catalysts based on a new synthesis route via formate. Initiated by this new technology, a new low-temperature DME synthesis method is also developed (ref. 2).

4, Graphene, carbon nanotube are also tuned as solid catalyst supports applied in syngas conversion to petrochemicals.