Development of Heterogenous Catalysts for Synthesis and Utilization of Hydrogen Energy Carrier

Faculty of Science and Technology





- Supply Instability in power generation from natural energy
- "Green hydrogen" synthesis from water using surplus electricity
- Portability and storability issues in hydrogen utilization
 ⇒ Utilization of hydrogen energy carrier substances

Research

Dimethyl ether synthesis from methanol over zeolite catalyst









Catalytic reaction test of

✓ Formation of meso-pores ≻Improvement of MeOH conversion
 ✓ Reduction of Si/Al ratio ≻Suppression of carbon deposition

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Content:

Toward the realization of a hydrogen energy society

In order to efficiently use the limited fossil fuel resources as energy, it is important to build a hydrogen energy society centered on the fuel cell power generation system. In addition, electric energy produced from natural energy such as wind power and solar power is inefficient in transportation and storage. Therefore, the problem is that the supply and demand peaks of electricity do not match. Under such circumstances, hydrogen energy has been attracting attention as an energy storage medium in recent years. However, hydrogen alone is a substance that is difficult to handle due to its poor storability and transportability. Therefore, it is desired to convert and handle hydrogen as another chemical substance that can easily extract and store hydrogen, so-called hydrogen energy carrier.

Development of solid-sate catalyst

In our laboratory, we are focusing on ammonia, methane, methanol, and dimethyl ether, which are candidate materials for hydrogen carrier substances. We are also developing solid catalyst materials such as supported metal catalysts and zeolite catalysts to efficiently proceed various heterogeneous reactions of synthesizing hydrogen carrier substances and of extracting hydrogen from them.

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