

Energy Conversion and Energy Storage

R&D Project Title: Innovative Ammonia Production Process Based on Integrated Design of Synthesis and Separation

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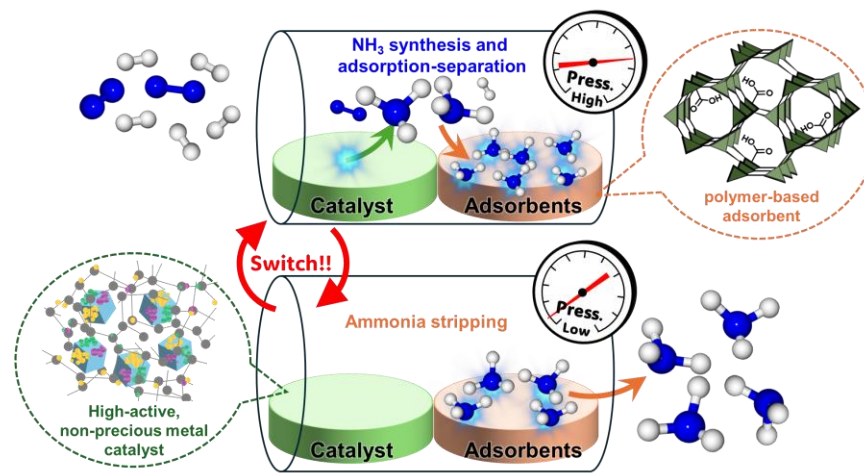
R&D Team: Tohoku University, Nagoya University



Summary:

Innovations in both the synthesis and separation processes are essential for the efficient production of ammonia. The goal of this project is to realize a reaction-adsorption-separation system by combining ammonia synthesis catalysts and ammonia adsorbents in the same reactor. This will establish an efficient ammonia production process.

- ✓ Development of high-active, non-precious metal catalysts for ammonia synthesis at low temperatures and pressures
- ✓ Design and development of new adsorbents capable of adsorbing ammonia under synthesis conditions
- ✓ Chemical engineering analysis toward the construction and optimization of a reaction-adsorption separation system



The proposed process can reduce CO₂ emissions by 82% per unit of ammonia production compared to the current process. If the projected 2050 ammonia demand is met using this process, CO₂ emissions could be reduced by approximately 710 million tons per year.