Innovative Circular Technologies for Harmful Nitrogen Compounds/ To Solve Planetary Boundary Issues

Theme 2. Recycling nitrogen compounds in wastewater to ammonia resource
Theme 2-2. R&D for NH_4^+ recycling by Separation and concentration
Structure optimization and modulization of hollow fiber FO membrane

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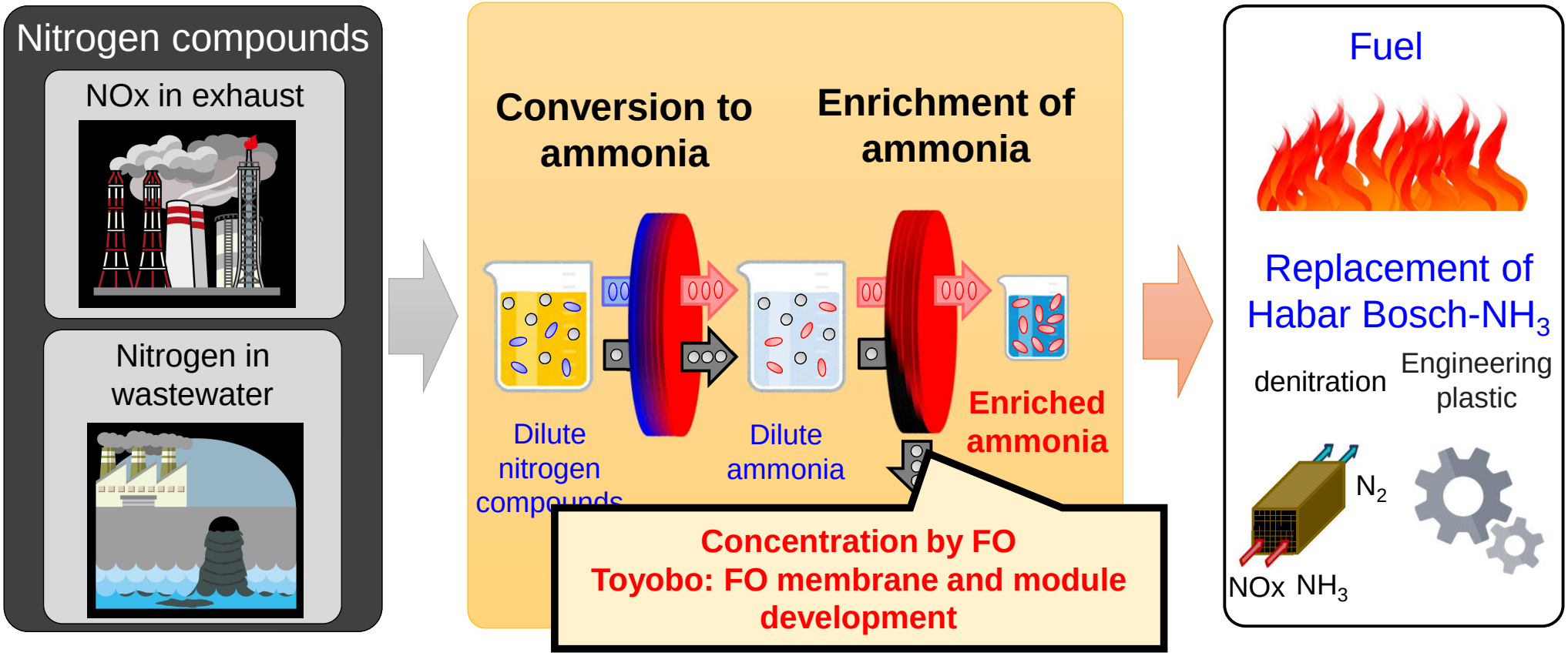
Implementing organizations : National Institute of Advanced Industrial Science and Technology (AIST),
The University of Tokyo, Waseda University,
Tokyo University of Agriculture and Technology, Kobe University,
Osaka University, Yamaguchi University, Kyowa,Hakko Bio Co., Ltd.,
ASTOM Corporation, Toyobo Co., Ltd., FUSO Corporation, Ube Industries, Ltd,

Position in the Project



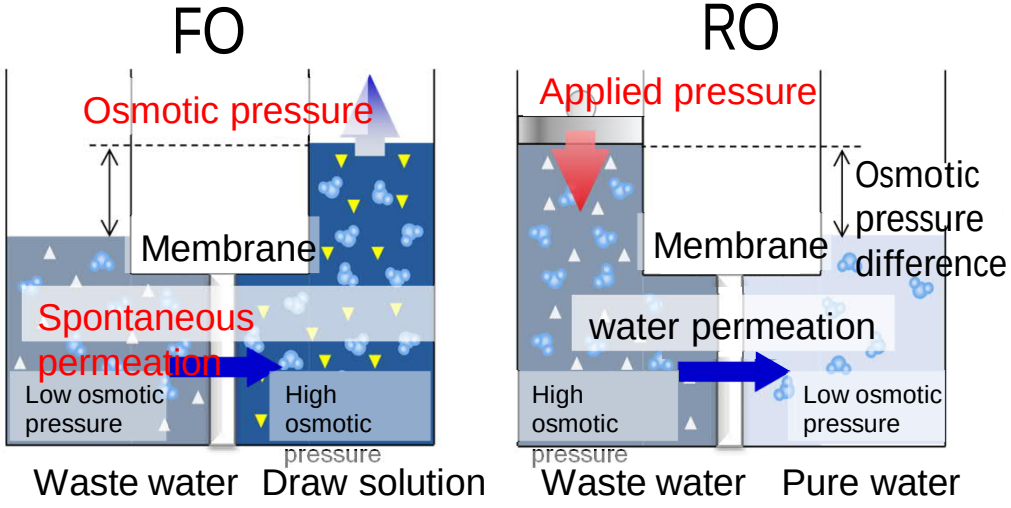
Target of Theme 2 for FY2029：Demonstration with a pilot plant with and enrichment on a scale of 5～15 m^3/d.

Position of Toyobo: Structure optimization and modulization of hollow fiber FO membrane

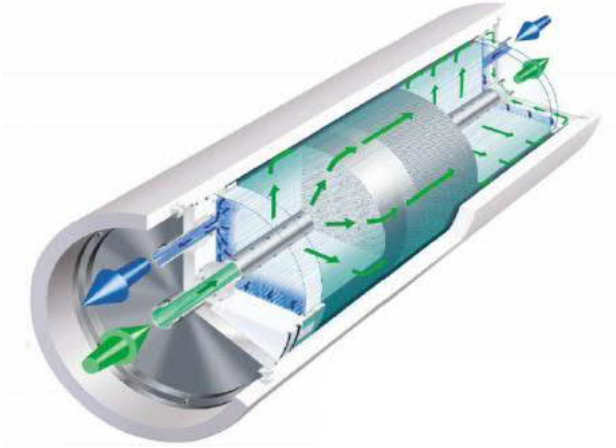
Target of Toyobo for FY2029:Establishment of FO system using 10inch modules and installation them into the pilot plant.

Details & Items of R&D

Structure optimization and modulization of hollow fiber FO membrane



FO mechanism comparing with RO



Structure of hollow fiber FO membrane module

【Advantage】

- Large area ・Uniform flow
- Chlorine resistance ・Fine fiber

Cross-wound structure

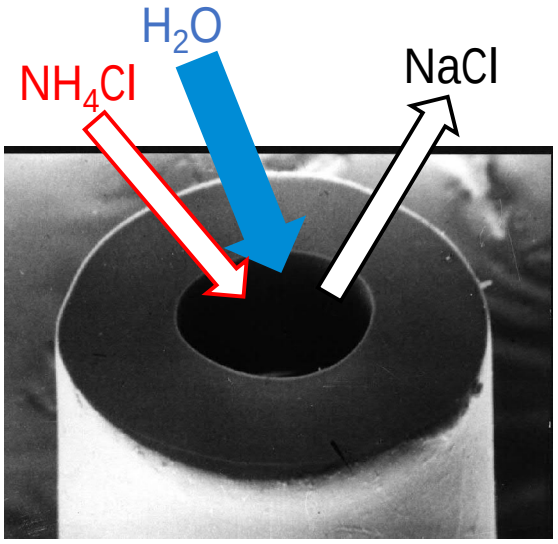
FO element

【R&D Items】

- Development of FO membrane for efficient concentration of NH_4^+
- Development of module using developed FO membrane

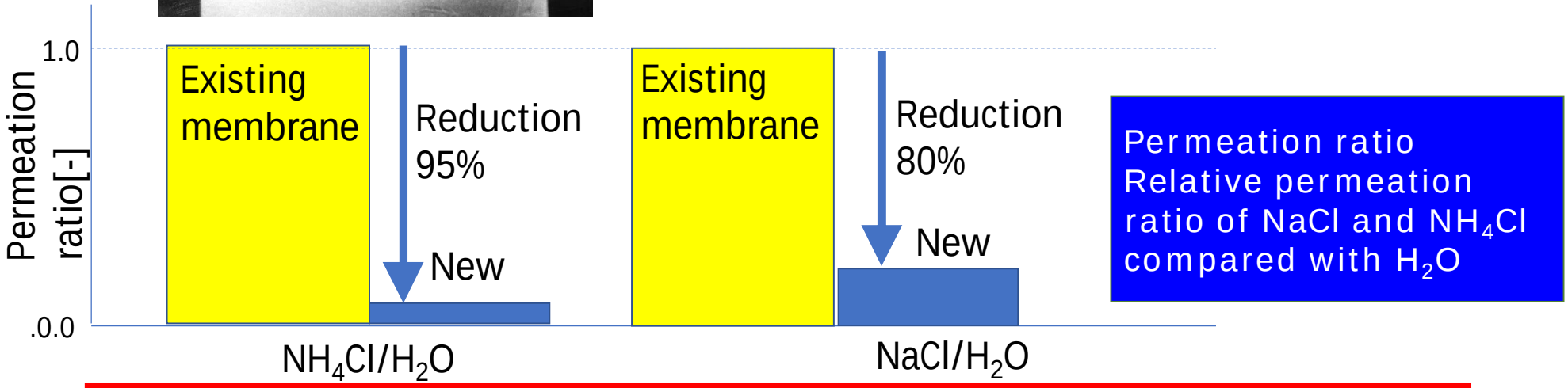
Achievement FO membrane development (Toyobo)

- Development of FO membrane for efficient concentration of NH_4^+
- More than 80% reduction of NH_4Cl/NaCl leakage



Bore : draw solution（seawater、NaCl）
Shell : wastewater（NH_4Cl）

Objective : water transport from wastewater
Problem① : NH_4Cl leakage from wastewater
Problem② : NaCl leakage from draw solution



Newly developed dense FO membrane reduced leakage of NH_4Cl from wastewater and NaCl from draw solution considerably.

Next step: development FO module using newly developed membrane

Summary

Position in the project

Structure optimization and modulization of hollow fiber FO membrane

Target for FY2029

Establishment of FO system using 10inch modules and installation them into the pilot plant

R&D items

- Development of FO membrane for efficient concentration of NH_4^+
- Development of module using developed FO membrane

Achievement

- Development of FO membrane for efficient concentration of NH_4^+
- More than 80% reduction of NH_4Cl/NaCl leakage


MOONSHOT
RESEARCH & DEVELOPMENT PROGRAM