

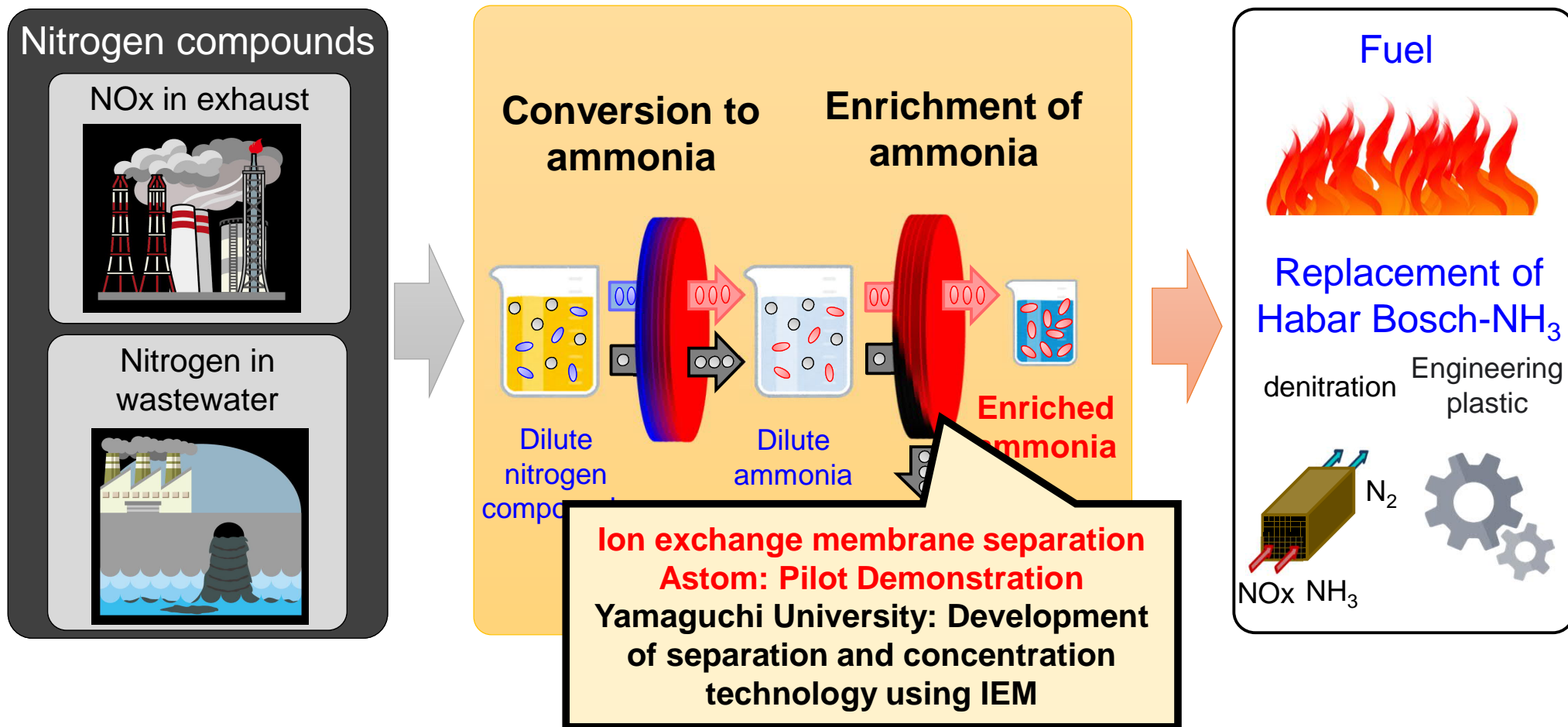
Innovative Circular Technologies for Harmful Nitrogen Compounds/ To Solve Planetary Boundary Issues

Theme 2. Recycling nitrogen compounds in wastewater to ammonia resource
Theme 2-2. R&D on ammonia recycling by separation and concentration
Development of IEM with high performance
and commercial size membrane module

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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,



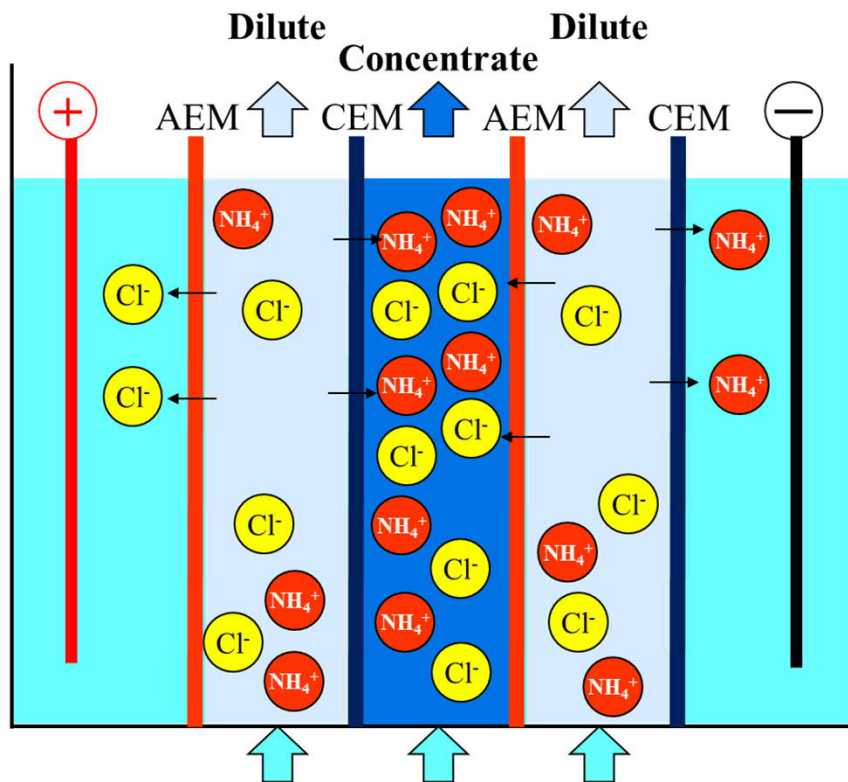
Target of Theme 2 for FY2029 : demonstration with a pilot plant with and enrichment on a scale of 5~15 m³/d.

Position of ASTOM: Realization of ammonia wastewater concentration process by ion exchange membrane (IEM) method.

Target of ASTOM for FY2029: Pilot demonstration using a membrane module for concentrating ammonia wastewater by the IEM method.

Development of IEM and large membrane module that realizes "separation process using IEM" developed by Yamaguchi University.

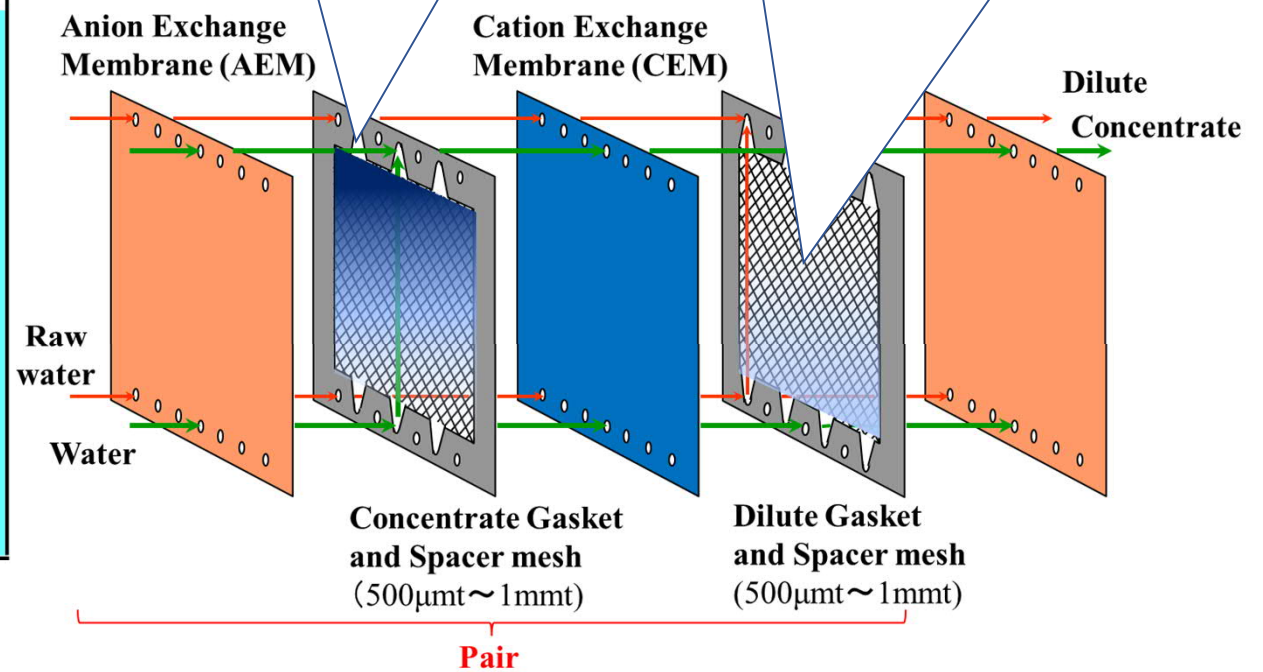
Principle of electrodialysis (ED) using IEM



Module structure that enables ED

Gasket: Isolation of Dilute and Concentrate, Prevention of external leakage

Spacer: Prevents contact between membranes, Forms a flow path, Promotes turbulence



R&D Items

- Development of IEM with high selectivity and low electrical resistance
- Development of materials for the IEM commercial size module.

Development of ion exchange membrane and gasket with high performance for increasing the size of the membrane module

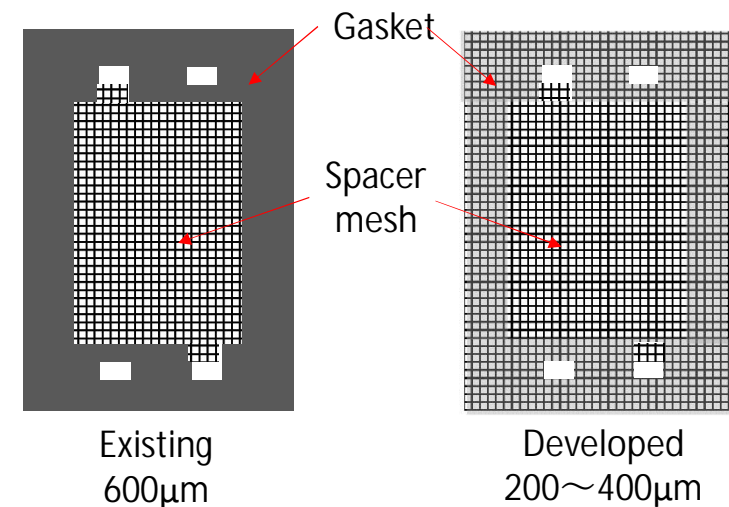
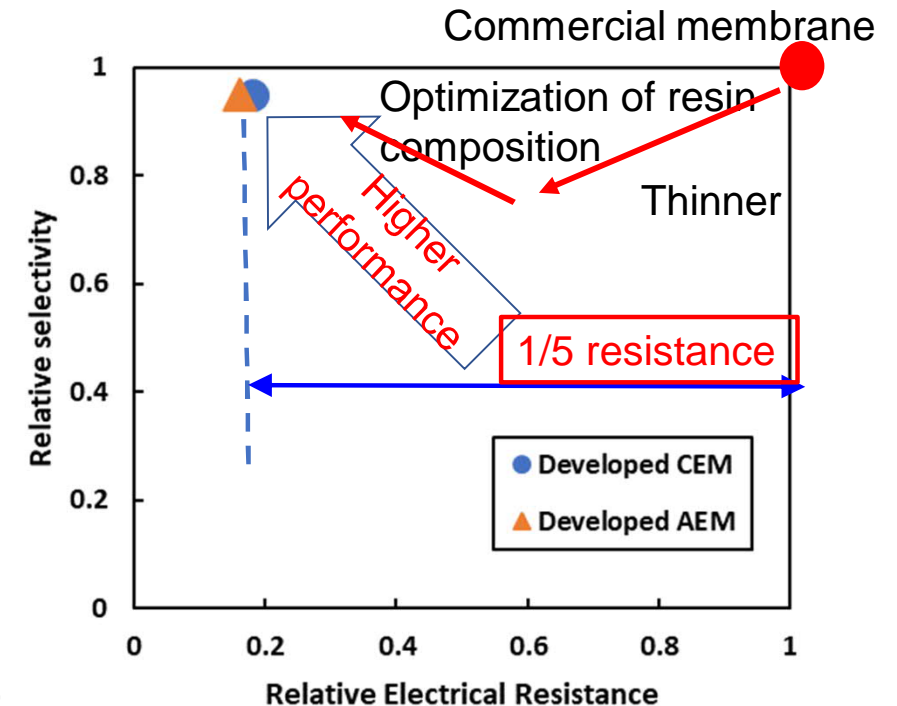
(Achievement 1)

We developed a membrane with **an electrical resistance of 1/5** or less of commercial ASTOM membrane while maintaining 95% relative selectivity, and provided it to Yamaguchi University.

(Achievement 2)

We developed a high-performance gasket with **a thickness of 200 to 400 μm** that can achieve low resistance and provided it to Yamaguchi University.

In order to maintain the handling strength even in thin thickness, **the gasket and spacer mesh are integrally molded.**



Position in the project

Realization of ammonia wastewater concentration process by ion exchange membrane (IEM) method.

Target for FY2029

Pilot demonstration using a membrane module for concentrating ammonia wastewater by the IEM method.

R&D items

Development of IEM and commercial size membrane module that realizes "separation process using IEM" developed by Yamaguchi University.

Achievement

- An IEM with an electrical resistance of 1/5 or less of the commercial ASTOM membrane while maintaining 95% relative selectivity has been developed.
- A high-performance gasket with a thickness of 200 to 400 μm that can achieve low resistance has been developed.

