Implementation of carbon fiber reinforced resin processing technology by high-temperature and high-pressure water ~ Collecting easy recyclable carbon fiber recycling ~

Carbon fiber reinforced resin

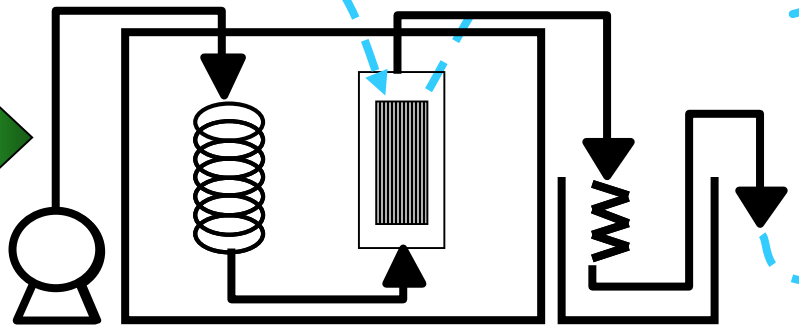
Light and High strength

Air plane body
Sporting goods
Electromagnetic wave shielding material

Carbon fiber（3000～5000yen/kg）

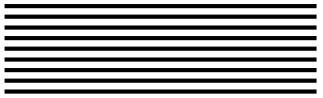
④Valuation

②Assessment of carbon fiber



High temperature and pressure water reactor

①Considering operating conditions



Recycled carbon fiber

Monomer

③Analyzing products

Wastes

Treating by water only.
Not required oxidants and organic solvent

Recycling methods

- **Utilizing for building materials after crushing.**
- **Analyzing resins on high temperature water vapor（1992）**
- **Changing to oil resins by pyrolysis.（1994）**

Processing methods

- **Incineration**
- **Reclamation**

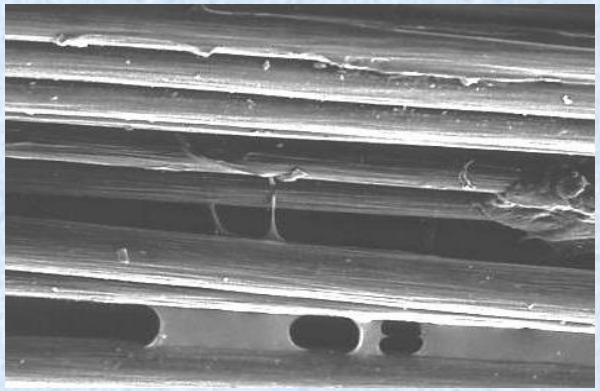
○Method of carbon fiber treatment
Patent publication 2002-180369

○Carbon fiber and method of it
Patent publication 2002-180379

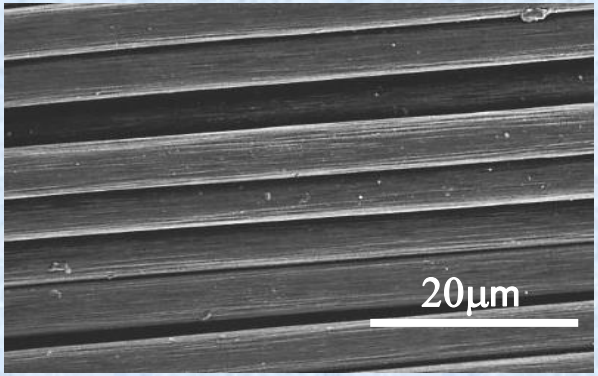
○Producing method of recycled carbon fiber
Patent publication 2003-190759

SEM observation result in each processing temperature

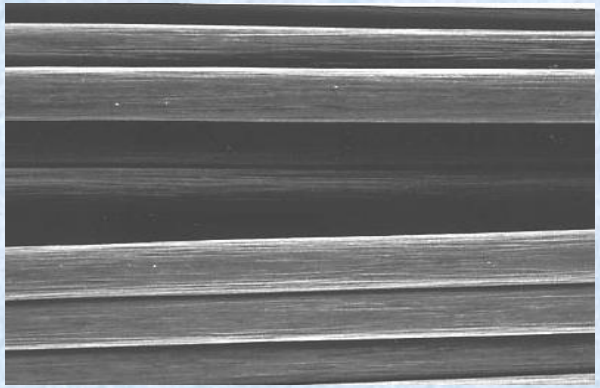
Pressure：30MPa、flow：5ml/min、time：30min



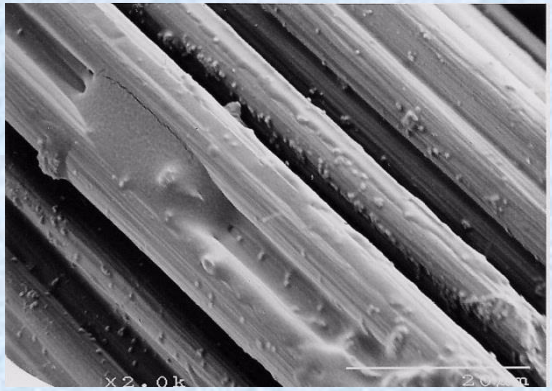
330℃（×）



350℃（△）



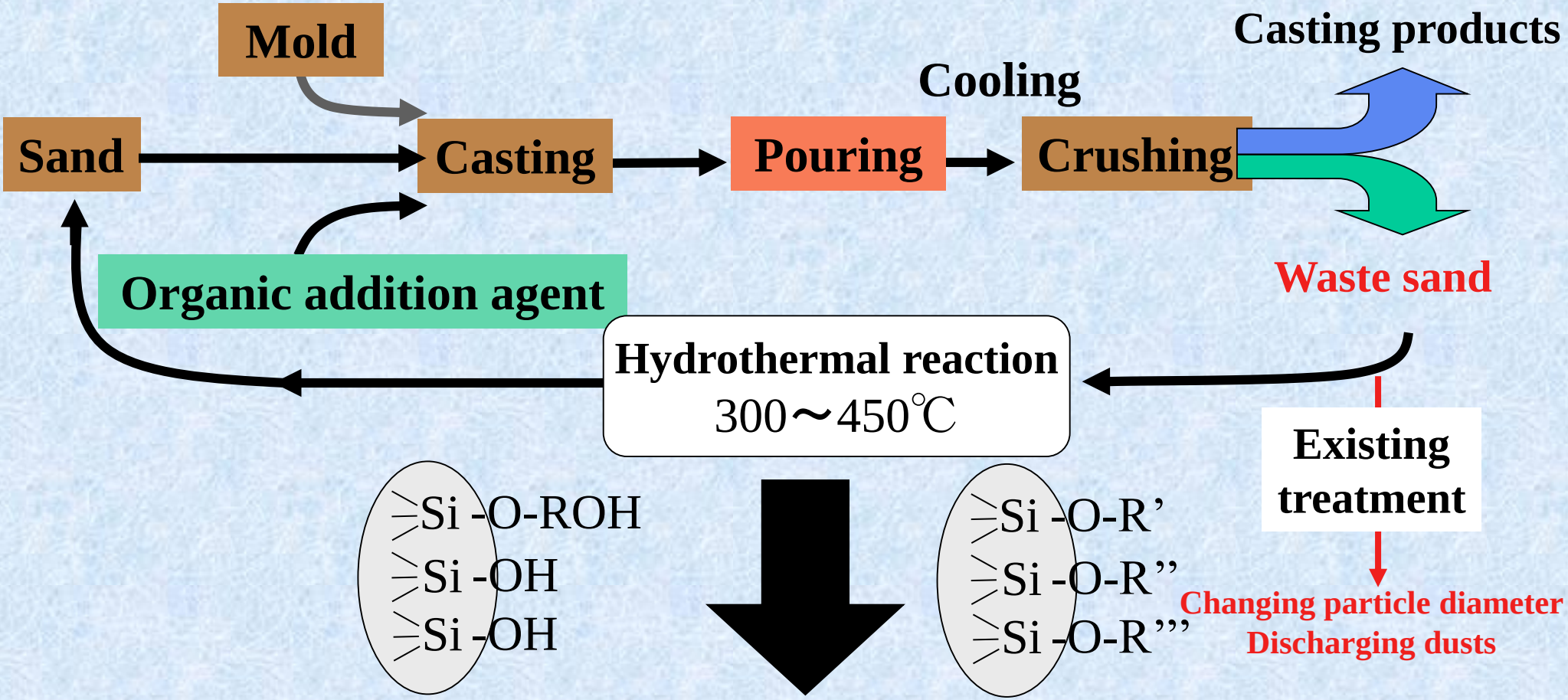
380℃（◎）



450℃（×）

Collection of the fiber which is cleaned by semicontinuous processing is possible

Waste casting sands by hydrothermal treatment (Improving the surface of inorganic compounds)



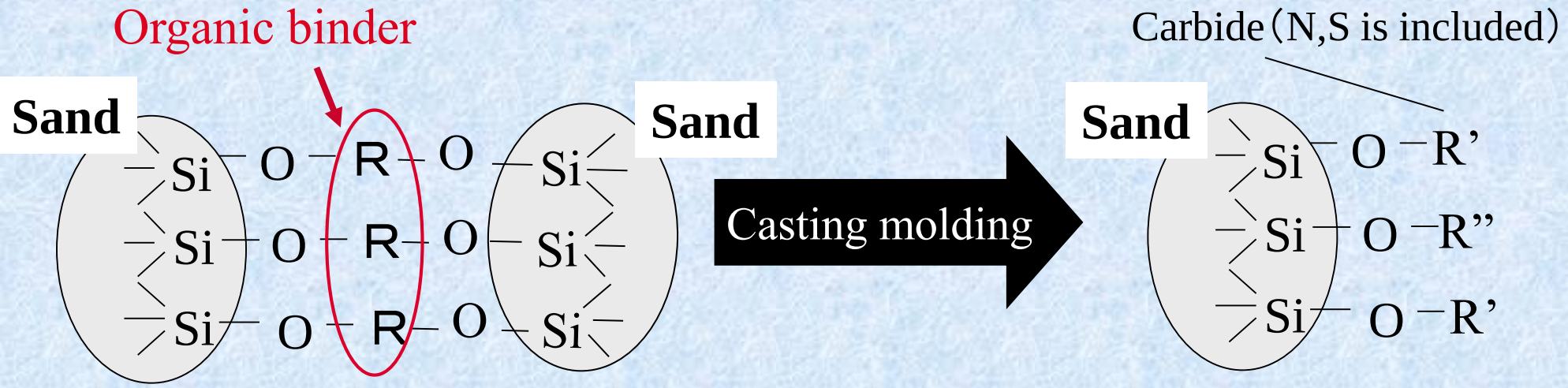
- Removing organic carbon and Nitrogen
- Increasing Si-OH(Silanol group)

→ **Increase in acidity** → **Improving the surface of sand**

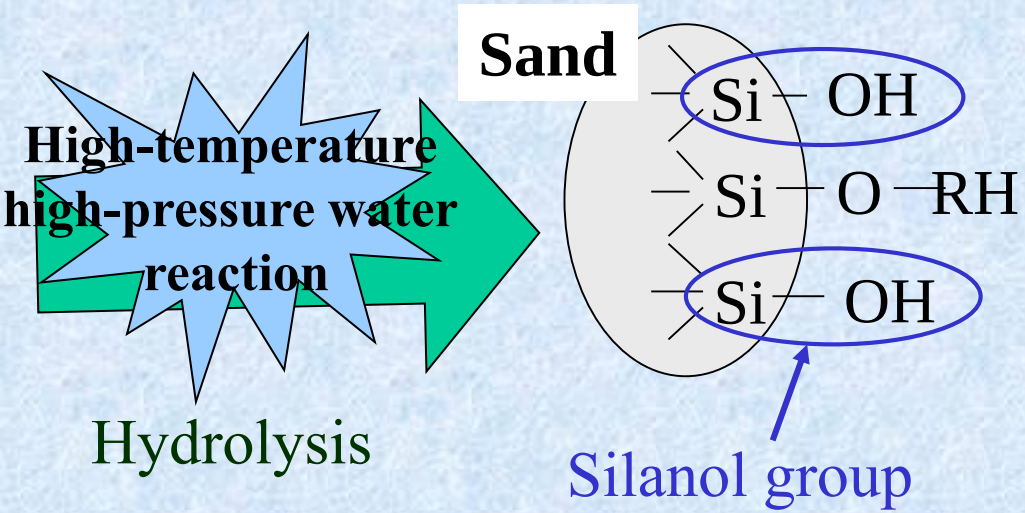
→ Improving bonds with binding agent

○**Recycling method of collection casting waste Patent publication 2002-178100**

The combination state of the sand・・・・



By reaction・・・



・The removal of organic carbon and nitrogen
・Increase of Si-OH（Silanol group）

Increase of the acidity

Surface reforming of the sand

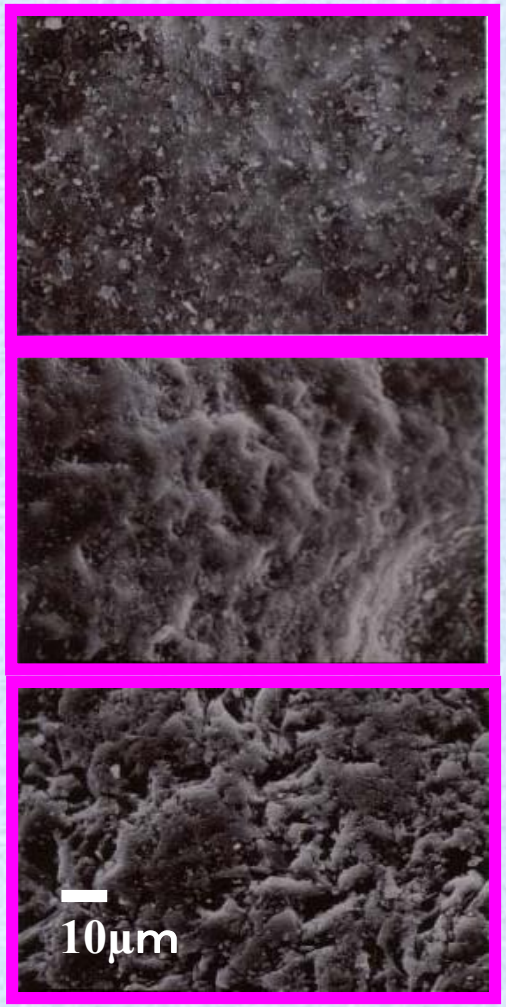
Binding improvement with the binder

Effect on Surface Characteristics

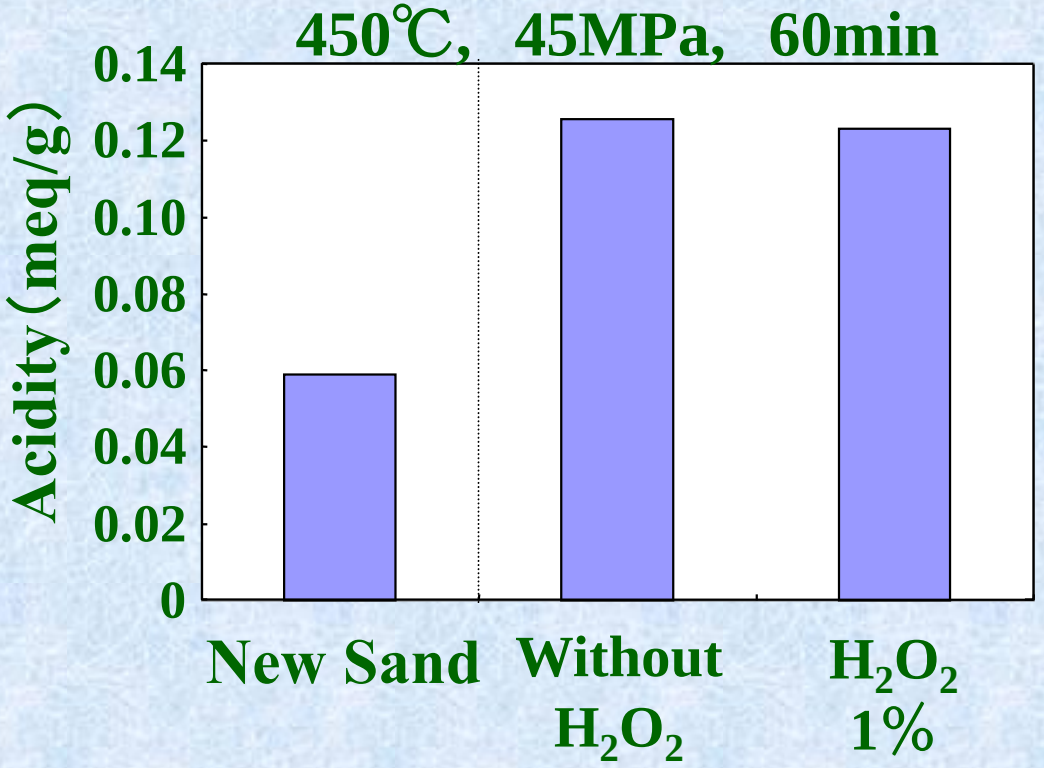
Waste Sand

450℃, 40MPa
Without H_2O_2

New Sand



SEM Photograph



Change of Surface Acidity

Development of the aluminum dross residual ash detoxification and recycling technology

Aluminum dross residual ash

At present → control type disposal ground

The residual substance which occurs in aluminum process of manufacture

hydrothermal reaction

Emission reduction technology to environment
Development of the recycling technology

Detoxification

eliminated for nitrogen, chlorine, fluorine

Upgrading recycling

Recycling promotion

Quantity of last disposal reduction

substitute of slag-making agent for iron and steel (fluorite)

heat acceleration materials , reforming materials , etc.

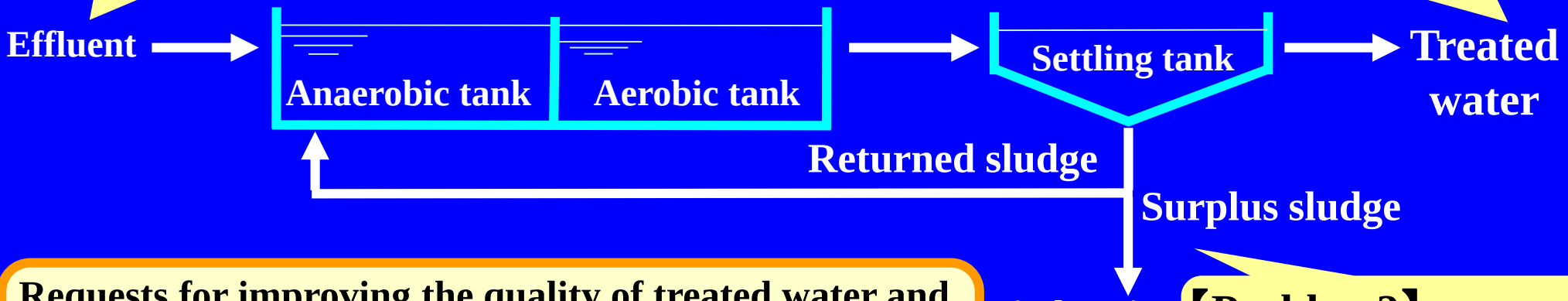
○Processors of a processing method of the aluminum nitride and the aluminum nitride Patent publication 2002-322519
○Processor of the aluminum dross residual ash

Existing waste water treatment process's background and problems

【Background】
- It's difficult to get landfill disposal plants.
- The fifth water use regulation
- Exhaustion of phosphorus resources
- Various solubilized surplus sludge of technology

【Problem1】
Increasing waste water

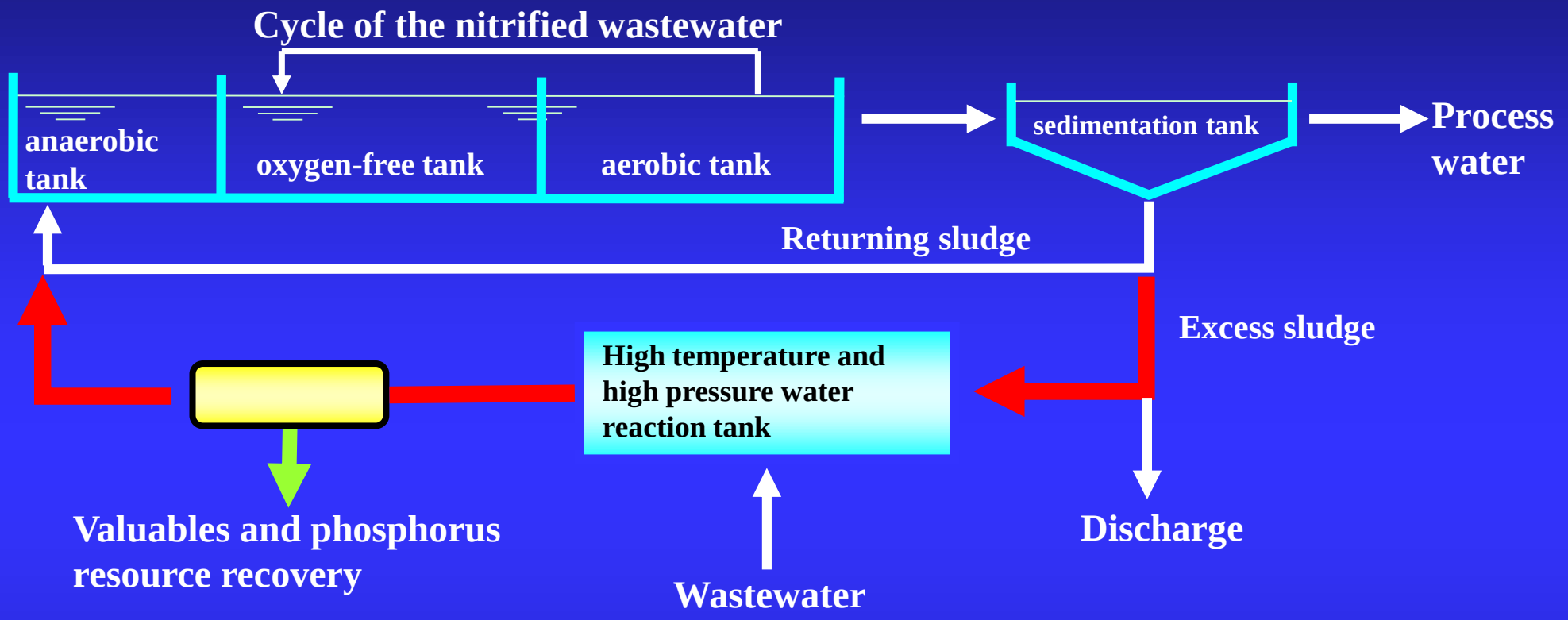
【Problem3】
Improving the quality of treated water



【Problem2】
Decreasing surplus sludge

Requests for improving the quality of treated water and decreasing surplus sludge
→ Existing contradictory requests

Suggestion of The Next Generation Wastewater Treatment Process



Schematic Chart of The Next Generation Wastewater Treatment Process （Phosphorus Resource Recovery Plant）

【Characteristic】

1）Evaluate energy of the whole process,
2）Reduce excess sludge discharge,
3）Recover valuables and phosphorus resource,
4）Improve the wastewater treatment performance