

# Introduction

2014年12月



**BUILD YOUR FUTURE !**

**大谷化学工業株式会社**  
**(Otani Chemical Industries)**

# Corporate Profile

- Name Otani Chemical Industries Co., Ltd.
- Address Kasuya-gun, Fukuoka Prefecture
- Katsumi Otani, President
- Started March 1961
- Established January 1965
- Capital JPY 10 mil.
- Employees 41 (including directors and part-time staff)
- Average age 39.7
- Affiliates Daishin Shoji Co., Ltd.  
Otani Co., Ltd.  
Otani Chemical Osaka  
Otani Chemical Pharmaceutical Research Inst.  
Y's Tech West Pte Ltd (Singapore)

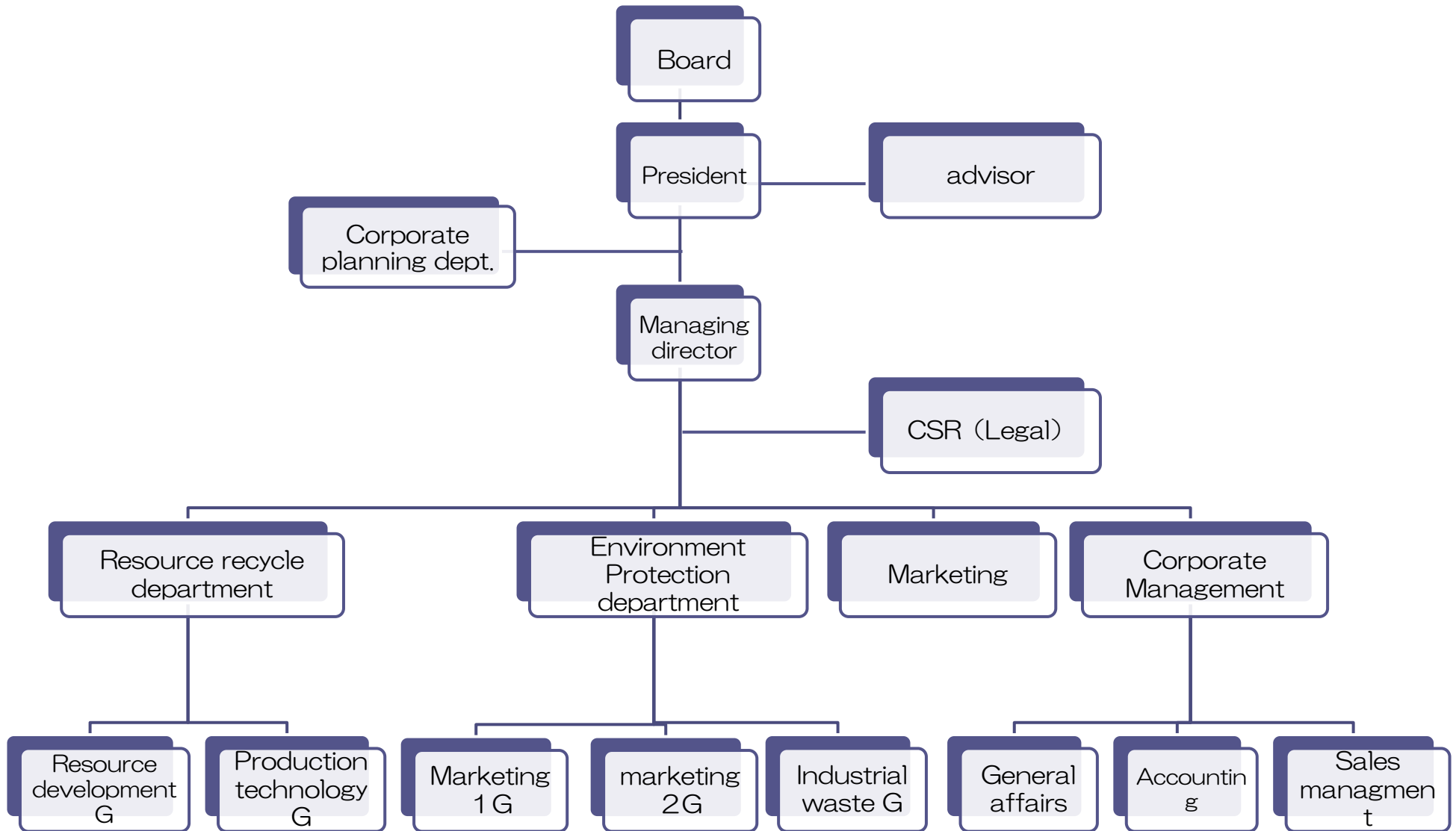
# Profile (Outline of products and businesses)

1. 『Recycle of Resources (precious metals, rare metals) 』
  - Silver
    - Waste liquid and scraps
  - Nickel (phosphorus)
    - Electroless nickel and nickel coating waste liquid
    - Waste water sludge
  - Other scraps including precious and rare metals
    - Precious and rare metals (Au、Pt、Pd、Ru、In、Co、Ta、Nbなど) scrap and waste
2. 『Waste treatment』
  - Medical waste
  - coating • semiconductors、 air conditioning effluents
  - Waste reagents、 special effluents
  - Other waste materials
3. 『Others』
  - Waste materials generated from dismantle and replace construction work
  - Trade companies (over-production materials)

# Corporate History

- March 1961 Nobuo Otani started business in Hakataku, Fukuoka City
- January 1965 Established the company
- 昭和48年6月 Obtained license for industrial waste treatment
- 平成5年3月 代表取締役社長に梅田 佳暉 就任
- 平成5年7月 特別管理産業廃棄物処理業許可
- 平成13年3月 Obtained ISO14001
- 平成14年5月 梅田 佳暉が社団法人(現公益社団法人)福岡県産業廃棄物協会会長就任
- 平成14年10月 廃棄物追跡システム「環境ガードシステム」特許出願
- 平成17年7月 社団法人全国産業廃棄物連合会副会長就任
- 平成18年6月～ 廃棄物処理業者優良性評価制度(基準適合)  
(山口県、福岡県、北九州市、福岡市、大牟田市、佐賀県、長崎県、長崎市、佐世保市、  
熊本県、熊本市、大分市、鹿児島県、鹿児島市)
- 平成20年1月 代表取締役社長に大谷 勝己 就任
- 平成20年4月～ Member of Fukuoka Prefecture Rare Metal Recycle Committee
- 平成21年4月 平成21年度福岡県リサイクル総合研究センター研究会 採択
- August 2009 「The system to collect nickel from non-electrolytic nickel plate waste liquid and solutions to extract nickel ion」Filed for patent
- 平成23年9月 平成23年度福岡県リサイクル総合研究センター共同研究プロジェクト採択
- 平成23年10月～ 優良産廃処理業者認定制度(平成22年廃棄物処理法改正後)  
(山口県、長崎県、熊本県、大分県、宮崎県、鹿児島県、福岡県 [平成24年10月末現在])
- September 2012 「The system to collect nickel from non-electrolytic nickel plate waste liquid and solutions to extract nickel ion」 Granted patent(No5360483)

# Organizational Structure 2014



# Corporate Philosophy

## Corporate Creed

### 『Harmonization • Sincerity』

- 「harmonization」 is to bring various elements together and unite.
- 「sincerity」 is to be true and earnest. To be sincere.

## Corporate Philosophy

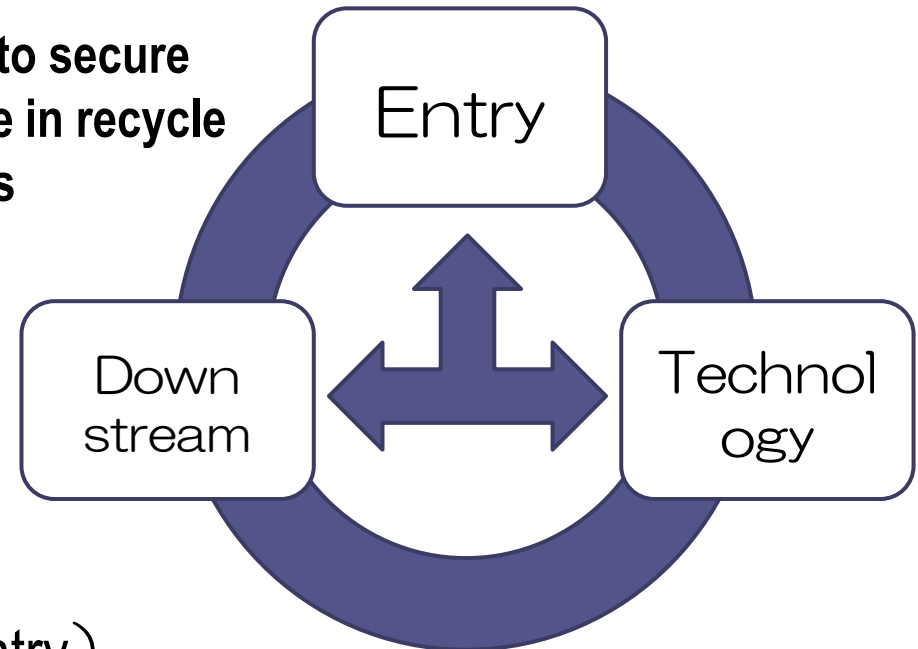
### 『To coexist with the society; and bring a realization of growth by both the company and all employees 』

- To be a company that is needed by the society and grow, through resource recycling and environment conservation.
- To link the growth of the company with the growth of the employees.

The above is what we aim.

# Conditions for Recycle Business

Factors in order to secure  
economic rationale in recycle  
business



① Social meaning

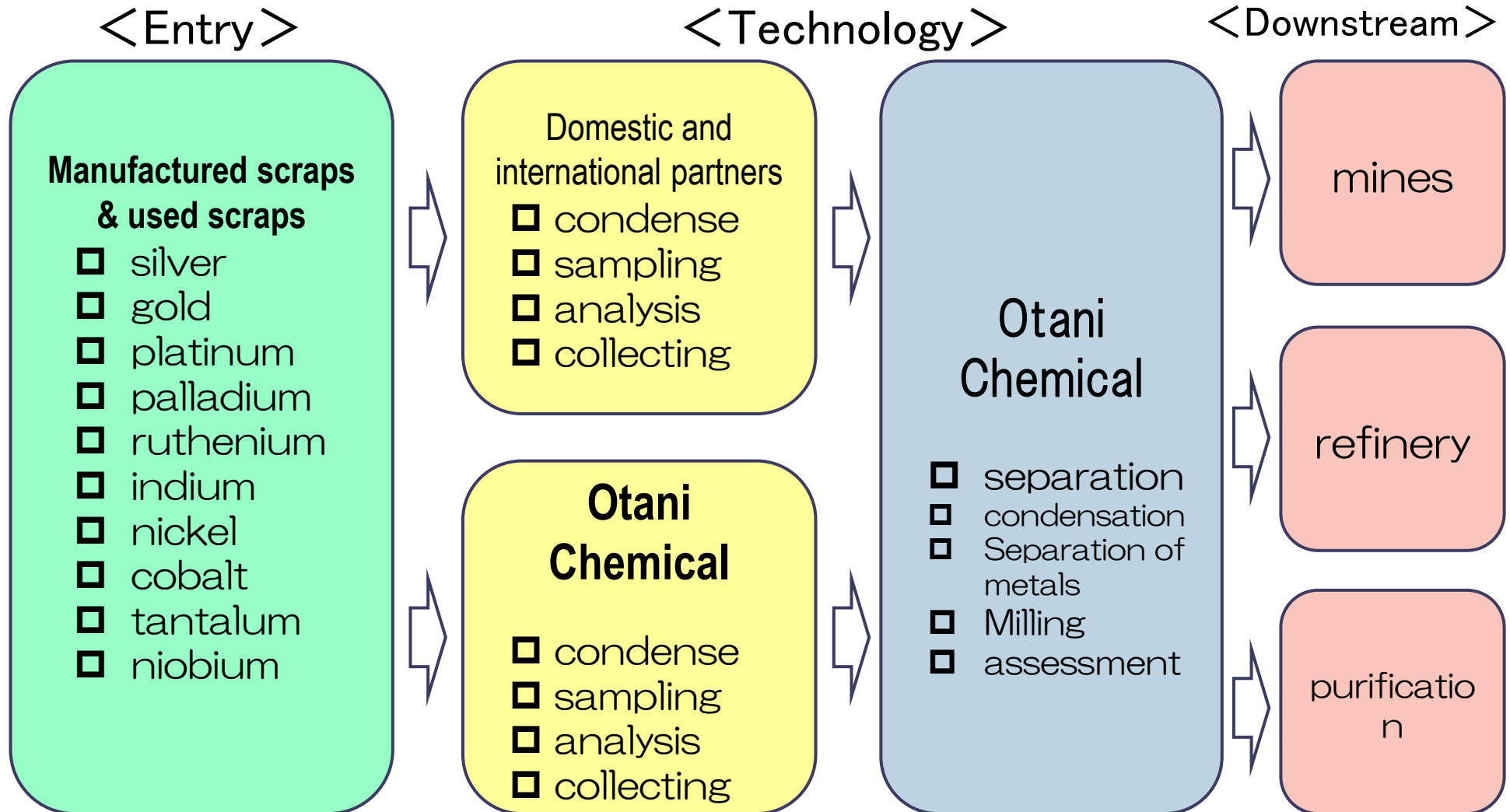
② Economic rationale

a. Secure good quality waste (entry)

b. Established recycle and reproduction technologies (technology)

c. Secure recycle goods market (downstream)

# Precious and rare metals business scheme

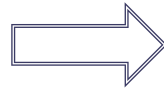




# 『Recycling of Silver』

- hospitals
- dentists
- film labs
- coating factories
- analyzing labs
- etc

fixers  
films  
coating  
Filming  
liquid  
Acyl  
chloridate  
Nitric  
silver



Electrolysis  
Chemical  
treatment  
Incineration



Refine  
Distill

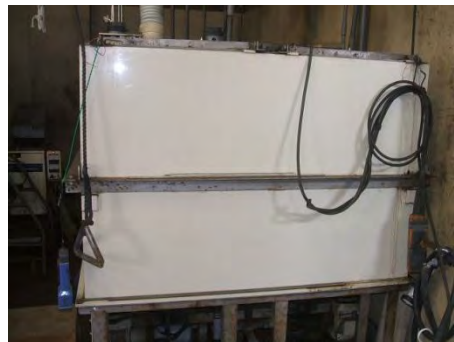


Film  
manufacturers  
Electric contact  
manufacturers

Collection of films



Electrolysis device



finery



Pure silver ingots



# 『Recycling of resources (precious and rare metals)』

1. **Collection of indium from transparent conductive layer scraps**
2. **Collection of nickel and phosphorus acid from non-electro nickel coating waste liquid**
3. **Collection of gold and palladium from lead frame scrap materials**
4. **Collection of platinum, ruthenium and other rare metals from hard disc media related scrap**
5. **Collection of nickel, cobalt, manganese and lithium from lithium ion battery related waste**
6. **Others**

**Indium powder**



**Platinum powder**



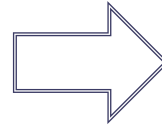
**Ruthenium oxide powder**



# 『Waste Treatment』

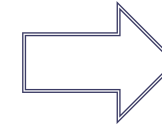
- Hospitals
- Coating factories
- IC factories
- Analyzing labs
- Research institutes
- Academic institute
- Others

Infectious waste  
 Waste acid  
 Waste alkali  
 Sludge  
 Plastic waste  
 Scrap metals  
 Scrap glass  
 Oil waste  
 Others



## < Intermediary Treatment >

Neutralization  
 Oxidation • reduction  
 Dehydration  
 Shredding  
 Compression



## < Final disposal >

Incineration • Landfill  
 Recycle

Neutralization • Storage facilities



Oxidation\* reduction facilities



Dehydration facilities



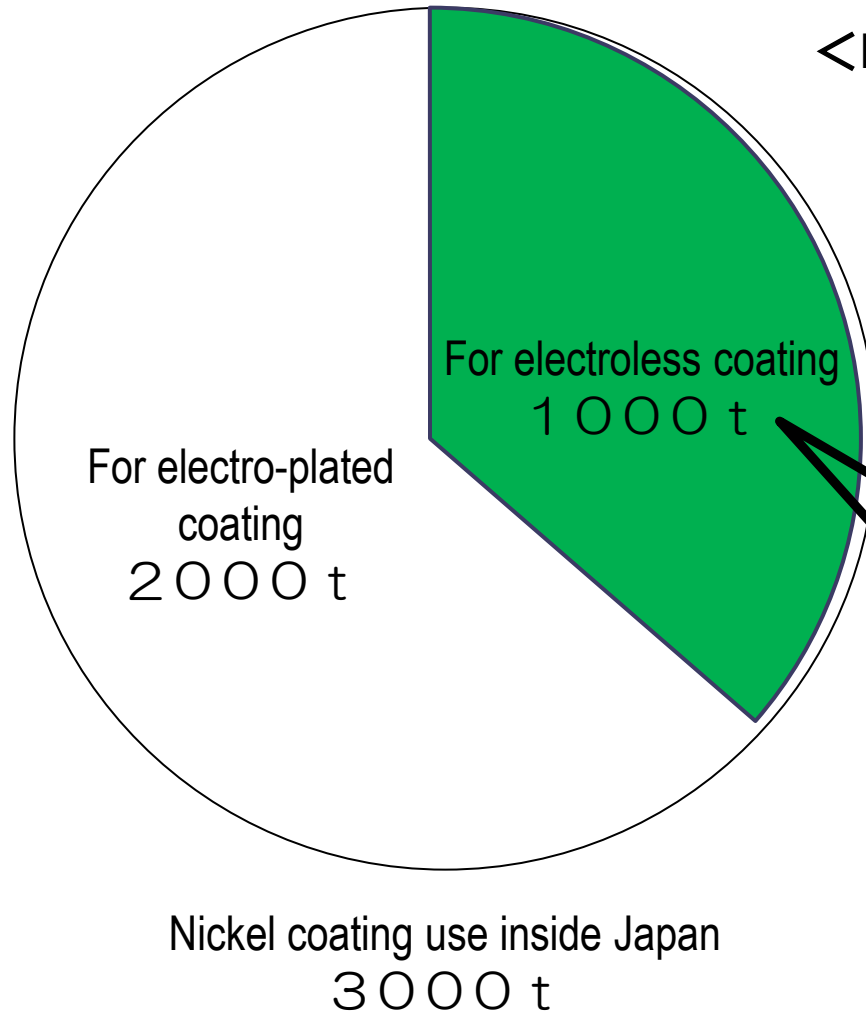
Infectious Waste



# Collection of Nickel and Phosphorus Acid from Non-electrolytic nickel plate waste liquid



# About Nickel (Ni) Coating



## < Main use of Nickel in Japan >

Stainless steel, Special Steel, Mixed metals such as coins  
Nickel hydrogen battery, lithium ion battery,  
Hard discs, Printers, electronics parts for automobiles

**Cluster of factories in  
South East Asia!**

The nickel generated from electroless coating liquid waste is 600-700 tons per year.

Most off them are disposed as industrial waste  
⇒ Huge burden on the environment ! !

# Recycle Flow of non-electrolytic nickel coating waste liquid

## Non-electrolytic nickel coating waste

liquid



Extraction of nickel solvent

Collection of nickel liquid

Nickel sludge or metal nickel

Condensing of remaining liquid

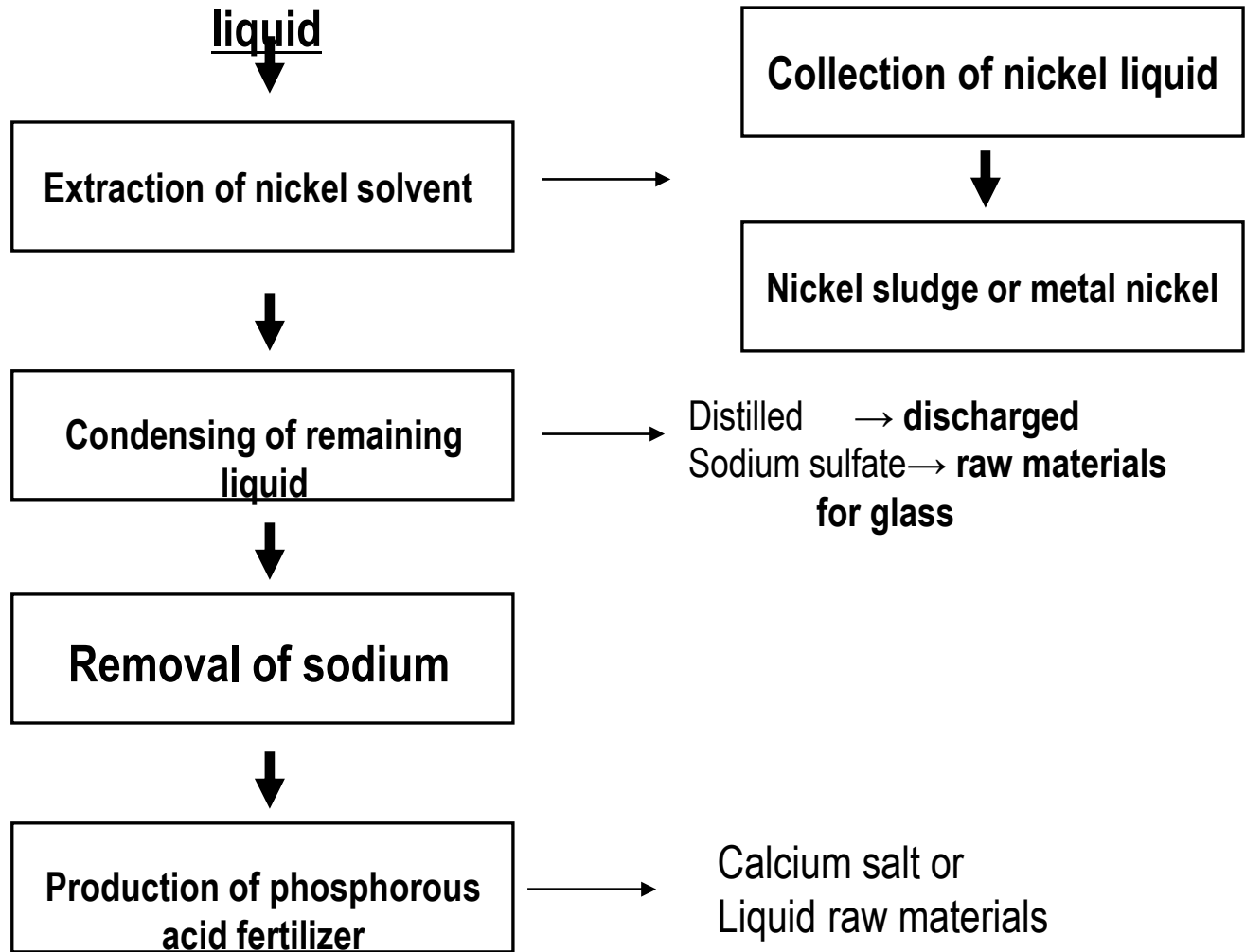
Distilled → discharged  
Sodium sulfate → raw materials for glass

Removal of sodium



Production of phosphorous acid fertilizer

Calcium salt or  
Liquid raw materials



# Experiment on extraction and exfoliation of nickel



(a)  
Before extraction



(b)  
stir

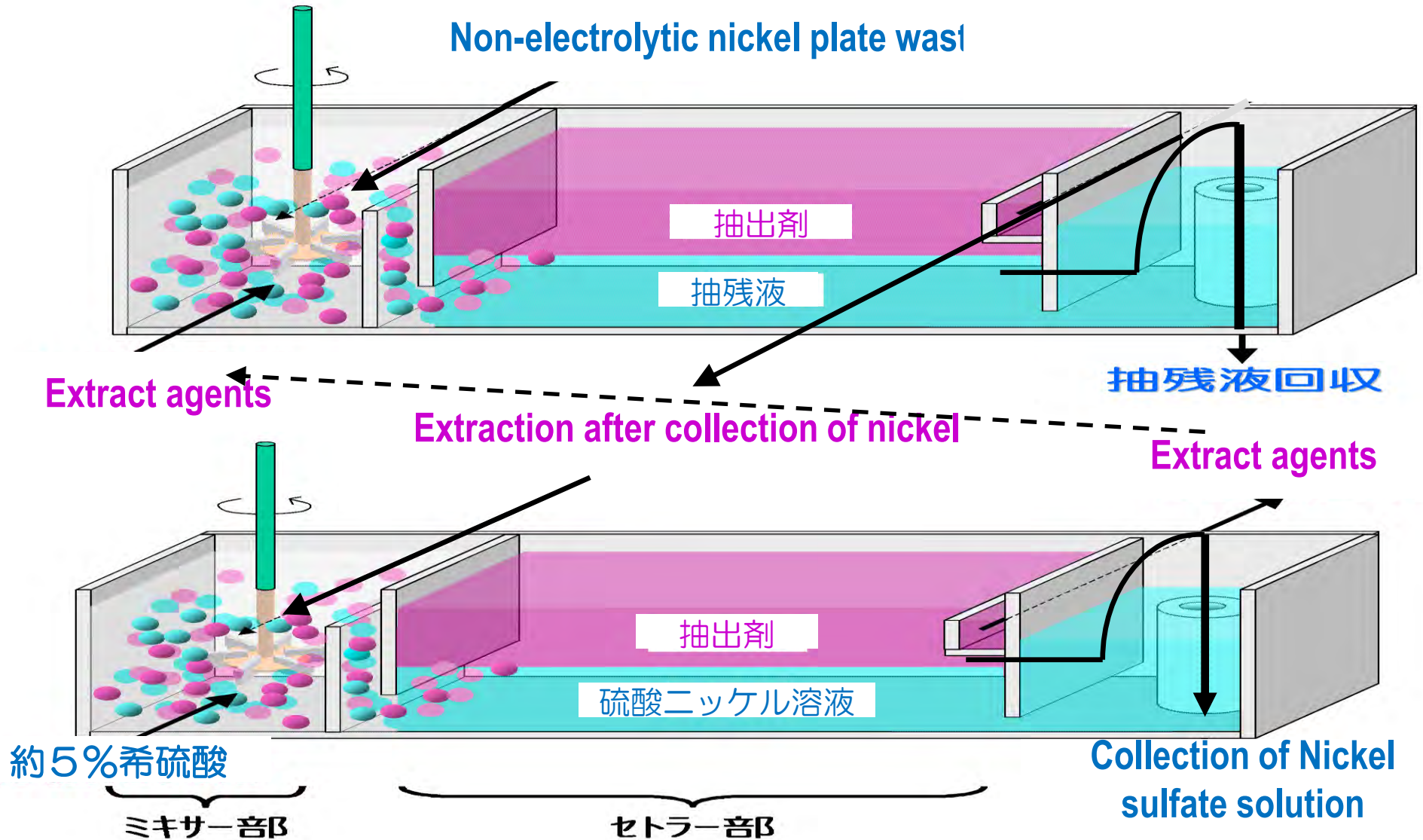


After extraction of  
nickel



After exfoliation of  
nickel

# Continuous extraction by mixer/settler





# Mixer/Settler

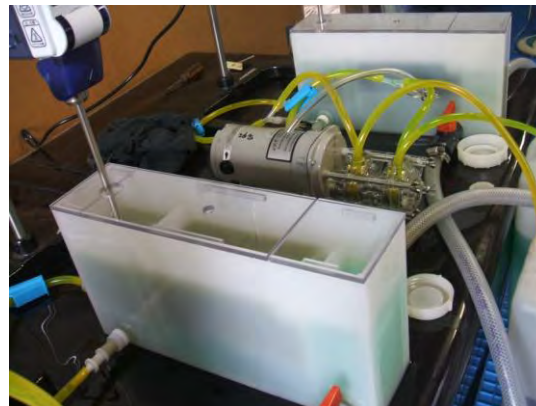


ミキサーセトラー  
実証実験機全体

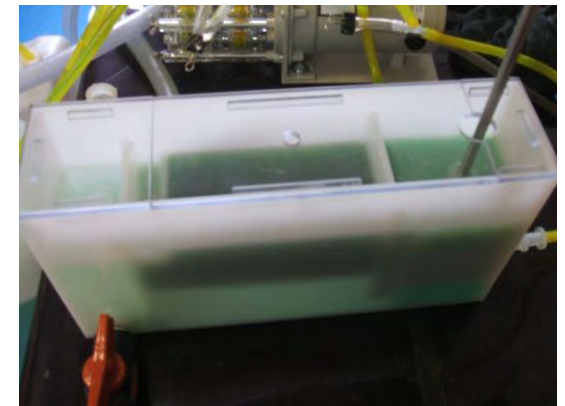


ミキサーセトラー  
実証実験機(側方から)

※ 本小型ミキサーセトラー  
(攪拌槽容量約2L)で  
12L/h程度、24時間稼働で  
300L/dayの処理が可能



抽出工程(奥)と剥離工程(手前)



抽出工程(左の透明な液が抽残液)

# Business model for recycling of non-electrolytic nickel plate waste liquid

Examples of collected nickel products



Metallic nickel



Nickel sludge

## The change in compositions of metals after nickel is extracted from non-electrolytic nickel plate waste liquid

Elements	Before treatment (ppm)	After treatment (ppm)
Nickel (Ni)	6,269.0	53.6
Zinc (Zn)	20.7	0.4
Iron (Fe)	13.9	7.7
Chrome (Cr)	1.34	—
Lead (Pb)	2.97	—
Cadmium (Cd)	0.26	—

pH: 4.4

# Business model for recycling non-electrolytic nickel plate waste liquid

## Reference value of phosphite acid as raw materials for fertilizers

< Excerpt from the Fertilizer Control Act of Japan >

Phosphite acid after the extraction can use for the product as raw materials under the below conditions;

### ① Phosphate (Phosphite) fertilizer as a byproduct

Phosphate fertilizer component in dilute solution of citric acid should be 15% or more.

### ② Liquid compound fertilizer

Total volume of phosphite acid contains 1% or more.

### ■ Per 1% of phosphoric acid (Phosphorus Pentoxide Acid(P<sub>2</sub>O<sub>5</sub>) conversion) content;

Cadmium (Cd)	0.75 ppm
Mercury (Hg)	0.5 ppm
Arsenic (As)	20 ppm
Lead (Pb)	30 ppm
Nickel (Ni)	50 ppm
Titanium (Ti)	200 ppm
Chromium (Cr)	500 ppm

- Other conditions such as Thiocyanate 50ppm, Sulfamic acid 50ppm, Biuret nitrogen 100ppm, Nitrous acid 200ppm.

< Our slogan >

# **BUILD YOUR FUTURE!**



**Thank you.**