

ISEC2017

The 21st International Solvent Extraction Conference

November 5 - November 9, 2017
Seagaia Convention Center, Miyazaki, Japan

Более 350 участников

29 стран в т.ч. Чили, ЮАР, Иран, Канада, страны
ЕЭС, Россия, Индия, Китай, Корея, Япония

4 параллельно работающие секции

Более 100 докладов в области экстракции РЗЭ,
переработки ОЯТ, извлечения ДМ,
гидрометаллургии, аналитики, новых
экстрагентов и растворителей,
сверхкритической экстракции и др.



Компании участники конференции



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CEM EDGE



is the world's largest primary producer of platinum, accounting for about 38% of the world's annual supply.

Экстракционные технологии аффинажа МПГ

Группа компаний



Разработка химико-технологических процессов в области переработки различных видов сырья; изготовление оборудования (экстракционного, сорбционного, емкостного, фильтровального, вентиляционного, лабораторного, гальванического, оборудования по газоочистке и др.)

ТриАрк Майнинг – СП ICT Group и компании «РТ-Глобальные ресурсы» Госкорпорации «Ростех», добыча и переработка РЗМ и ниобия, производство высокотехнологичных материалов на основе РЗМ.



Стендовые доклады

EFFECTIVE SEPARATION OF Pt(IV), Pd(II) AND Rh(III) IN ACIDIC SOLUTION BY USING PHOSPHONIUM IONIC LIQUID

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ABSTRACT

1. INTRODUCTION

Precious Group Metals

Application

- Fuel Cell
- Automobile catalyst
- Electronic device

PGMs Consumption

150 T/year

Automobile 40%
Jewelry 37%
Electronic 23%

PGMs production limitation

- Present in low quantity
- Difficult to collect
- Unstable supply
- Huge gap between supply and demand

Alternatives PGMs Source

Waste Recycling

Automobile waste 40%
Jewelry waste 19%
Electronic waste 24%

Continuous increase over the next several years

These wastes are useful secondary resource for PGMs

Metal Groups (PGMs) Advantages

- Heat Resistance
- Heat Tolerance
- Good electrical conductor
- Facile Process

Development of effective extraction systems for PGMs using phosphonium ionic liquid

Using novel phosphonium ionic liquid, tricothyldecyl phosphonium chloride for PGMs extraction

EXPERIMENTAL

Development of effective extraction systems for PGMs using phosphonium ionic liquid

Using novel phosphonium ionic liquid, tricothyldecyl phosphonium chloride for PGMs extraction

IONIC LIQUID

- Negligible vapor pressure
- Non-flammable
- Tunable properties
- Structure design
- Anion-cation pairing

Hydrophobic ionic liquid

Water

Novel liquid in this study

Newly Designed and Synthesized

Commercially Available

Tricothyldecylphosphonium chloride
Tributyltetradecylphosphonium chloride

2. EXPERIMENTAL

Development of effective extraction systems for PGMs using phosphonium ionic liquid

Using novel phosphonium ionic liquid, tricothyldecyl phosphonium chloride for PGMs extraction

3. RESULTS AND DISCUSSION

Development of effective extraction systems for PGMs using phosphonium ionic liquid

Using novel phosphonium ionic liquid, tricothyldecyl phosphonium chloride for PGMs extraction

Synthesis of methacrylate-Styrene Copolymer Containing a Sulfur Atom and Extraction Equilibrium of Gold(III) from Hydrochloric Acid

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²Department of Applied Chemistry, University of Miyazaki, Japan

Introduction

Consumption of Rare metals in Japan
70% OF THE WORLD!

Wastes of Au 150t/yr

Urban mine (containing rare metals)

Potential resources

Recovery

method

selective recovery

large extraction capacity

easy back-extraction

organic phase

aqueous phase

selective recovery!

in this study, the novel polymer type is chloroacrylate-*o*-(3-thiomethylpropyl) (ATPS) was synthesized and the extract metals were investigated. ATPS is a novel selective recovery of rare metals. ATPS functional groups in its polymer skeletons group 3-mercaptopyridine contains S as selective extraction for rare metals. In addition, it is considered that the gold metal complexes and make it more

Synthesis

Functional group (S and N atoms)

Polymer skeleton

DMF, K₂CO₃

1-methyl-2-(chloromethyl)-4-(chloromethyl)-5-(3-thiomethylpropyl)amine (MCM-ClM)

2-thiomethyl-*o*-(3-thiomethylpropyl)amine (MTPM)

3-methyl-2-(chloromethyl)-4-(chloromethyl)-5-(3-thiomethylpropyl)amine (MTPM)

Reactor and synthesis step

Reflux

120rpm

MP 4g / DMF

ACM-ClM 5g
K₂CO₃ 12g
DMF 200ml

DW, Chloroform

Separation

0.1M-HCl

0.1M-NaOH

Evaporation

polymer gel

Yield : 66%

Physical properties

Molecular weight 5.4 × 10⁴ [g/mol] / Chloroform

Interfacial tension 16.1 [mN/m]

Quantitative of Nitrogen atom

Absorption amount of H⁺

0.25wt%-ATPS /chloroform

HCl solution

shaking, 24h, 303K

Titration by NaOH

Fig. 1 Langmuir plot for Adsorption of H⁺

Extraction selectivity in HCl solution

Extraction from mixed solution

Cu: 0.1 → 250mM, 1.1M HCl

Changes in extraction ratio with time

Loading test of Pd(II)

0.1 → 1.0mM / 20min

Selective extraction of antimony and arsenic with alkylated piperazine

(Miyazaki University) Shintaro Kanemaru¹, Rieko Miura, Tatsuya Oshima, Yoshinari Baba

1. Introduction

antimony

Antimony is superior in incombustibility and wear resistance.

- Flame retardant auxiliary
- Lead battery

Resources are maldistributed in the specific countries, and Japan depends on the import

e-waste recycling rate is almost 0%

environmental pollution problems

Development of the selective extractant is important.

What is a solvent extraction?

Solvent extraction is a selective separation method for isolating and concentrating an objective material from aqueous solution containing extractant.

organic phase

aqueous phase

2. EXPERIMENTAL

3. Results and discussion

Metal extraction selectivity

TEHA

log[HCl]_{aq}

Extraction percentage (%)

● Sb(III)
● Sn(IV)
● Au(III)
▲ As(V)

DDCMP

log[HCl]_{aq}

Extraction percentage (%)

● Sb(III)
● Sn(IV)
● Au(III)
▲ As(V)

Fig. 1 Effect of concentration of hydrochloric acid on the extraction percentage of metal ions with TEHA and DDCMP.

Stripping of metals extracted

PGM Extraction Properties of Calix[4]arene-Based *n*-Dialkylamino Extractants from Leach Liquors of Automotive Catalysts

Manabu Yamada¹, Yu Kaneta², Muniyappan Rajiv Gandhi², Yoshihiko Kondo², Uichi Akiba², Kenshu Fujiwara²

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Introduction

Solvent Extraction

Extraction

Stripping

Developed Calixarene Extractants

SMC

This time Developed Extractants

Fig. 1 Structure of calix[4]arene-based extractants

By introducing hydrophobic and long alkyl chains

Extractants may show solubility in hydrocarbon-based diluents such as hexane

Experimental

Synthesis of Calixarene-based Extractants

1: R = CH₃
2: R = C₂H₅
3: R = C₄H₉
4: R = C₆H₁₃
5: R = C₈H₁₇
6: R = C₁₀H₂₁
7: R = C₁₂H₂₅
8: R = C₁₄H₂₉

Extraction Procedure

Shaking 300 rpm

Centrifugation 3500 rpm

The aqueous phase were measured by ICP-AES

Extraction percentage (E%) were calculated by using equations (1) and (2).

$E\% = \frac{[M]_{org}}{[M]_{org} + [M]_{aq}} \times 100$ (1)

$[M]_{org} = [M]_{org} - [M]_{aq}$ (2)

Result

Solubility of extractants for diluents

Table 1 Investigation of solubility of 1 - 8 in diluents

Diluents	Boiling point (°C)	Dielectric constant	Solubility in diluents							
			1	2	3	4	5	6	7	8
CHCl ₃	61.0	4.81	N.S.	G.S.	G.S.	G.S.	G.S.	G.S.	G.S.	G.S.
1,2-Dichloroethane	83.5	10.38	—	G.S.	G.S.	G.S.	G.S.	G.S.	G.S.	G.S.
<i>o</i> -Dichlorobenzene	180.3	9.93	—	N.S.	G.S.	G.S.	G.S.	G.S.	G.S.	G.S.
Chlorobenzene	131.0	9.62	—	N.S.	G.S.	G.S.	G.S.	G.S.	G.S.	G.S.
Toluene	110.0	2.38	—	N.S.	N.S.	G.S.	G.S.	G.S.	G.S.	G.S.
Xylene	138.4	2.20	—	N.S.	N.S.	N.S.	N.S.	N.S.	G.S.	G.S.
Kerosene	150-300	1.80	—	N.S.	N.S.	N.S.	N.S.	N.S.	G.S.	G.S.
Shellac D70 [®]	193-245	2.10	—	N.S.	N.S.	N.S.	N.S.	N.S.	G.S.	G.S.

Выставка оборудования

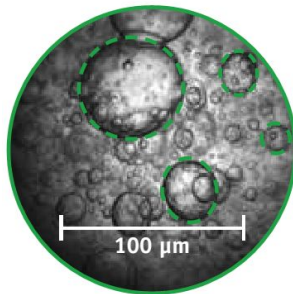


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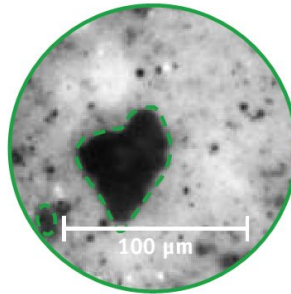
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BETWEEN MEETINGS

Gastronomic brilliance
This gourmet's dream offers innovative cuisine using local produce. Specialty fish and shellfish is our claim to fame. Cuisine from all over the world is offered at reasonable prices at first-class, gourmet, trendy or traditional restaurants. Sjörenskastråket are awarded with a Guide Michelin star.

Attractions
Gothenburg and West Sweden offers an exceptional combination of city life, culture and nature. Historical and contemporary attractions and activities are miles with a wide repertoire of entertaining shows, sports, cultural events, shopping, fairs and exhibitions.

A number of prominent cultural institutions are found in five minutes walking distance. View the unique collection of Nordic art at the Museum of Art or enjoy Gothenburg Symphony Orchestra at the Concert Hall.

Relax
In less than half an hour you'll be on a boat taking you to the picturesque islands of the archipelago. The many islands stretch along the coast like a string of pearls. The many tree-covered parks, as well as forests and lakes are only a stone's throw away.

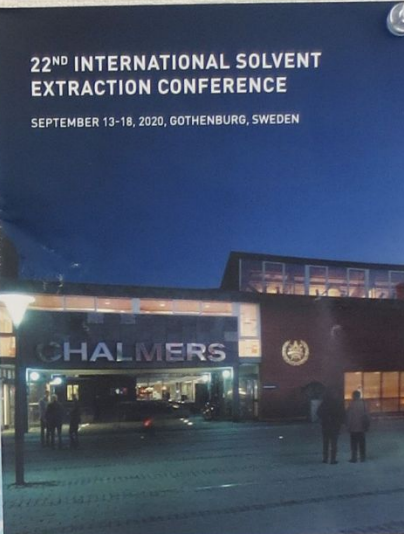
GETTING HERE IS EASY

- International airport less than 20 minutes from the city centre.
- 80 direct flights from more than 60 destinations.
- Ferry from Kiel and Friedrichshafen.



22ND INTERNATIONAL SOLVENT EXTRACTION CONFERENCE

SEPTEMBER 13-18, 2020, GOTHENBURG, SWEDEN



CHALMERS

gothenburg

SAVE THE DATE

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AUGUST 18-21, 2019 | VANCOUVER, BC, CANADA

Metsoc, the 58th annual Conference of Metallurgists (COM 2019) and CIM are honoured to host Copper 2019, marking a milestone in the International Copper Conference Series with the 10th Edition.

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