



pure
bohemia



when the small things

MAKE THE BIG DIFFERENCE

www.purebohemia.cz

Separation und Raffination von Metallen in der Dünnschichtindustrie

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PURE BOHEMIA

RENOVATION AND CLEANING
OF MACHINE PARTS AND MACHINERY

SEPARATION AND REFINING
OF PRECIOUS AND VALUABLE
METALS



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Indium recuperation



ABOUT COMPANY

The new company named Pureon, s.r.o. was established at the turn of years 2012 /2013.

At the beginning of the year 2013 was Pureon, s.r.o. renamed to Pure Bohemia, s.r.o. where the new development department was established.

The development department consists of wet etching laboratory, electrochemical laboratory, melting laboratory, analytical laboratory and laboratory for separation processes. The team of development department consist specialist of chemical engineering, hydrometallurgy, electrochemistry and organic technology.

Development department is cooperate with University of chemical technology in Prague.

The years of 2013, 2014 and 2015 mean the growth of the company.



WHAT WE CAN DO

We can renovate (clean) an extensive range of metals and non-metals deposited on a variety of substrates (metals, plastics, glass, and ceramics).

We can recycle and refine valuable depositions emerged in customer processes. On the basis of our expertise we offer a recovery of precious metals.

Our R&D team has been improving our possibilities of cleaning and recycling continuously. We develop customized technological procedures for individual customers.



SUMMARY OF OUR ACTIVITIES

RENOVATION AND CLEANING OF MACHINE PARTS AND MACHINERY:

Chemical:

Degreasing
Selective wet etching
Stripping
Electropolishing

Mechanical:

Stripping
Sandblasting
Polishing
Small parts replacement

Metallization:

Flame
Plasma

Spare part production:

Sheet metal folding
Laser cutting
Water jet cutting

RECYCLING AND RECOVERY OF PRECIOUS METALS:

Separation:

Precious metals
CIG and similar mixtures

Refining:

Gold, silver, indium

RESEARCH AND DEVELOPMENT OF NEW TECHNOLOGIES:

Laboratory equipment
Team of scientists
Customized development
Application of new technologies



TARGET MARKETS AND HOW IT WORKS

Automotive industry

Semiconductors

Aviation industry

Health care industry

Photovoltaics

Cutting tools

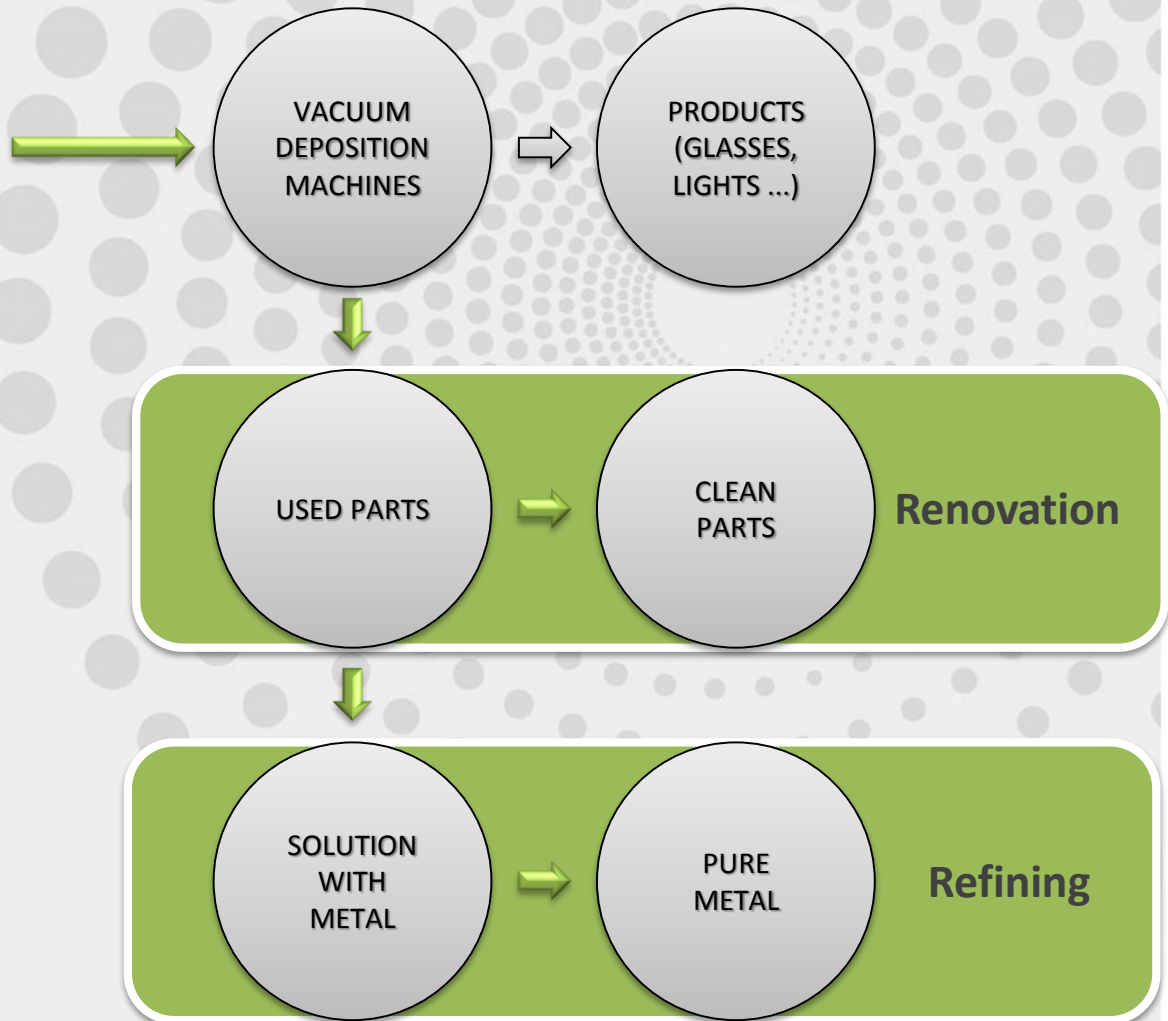
Optical systems

Watches

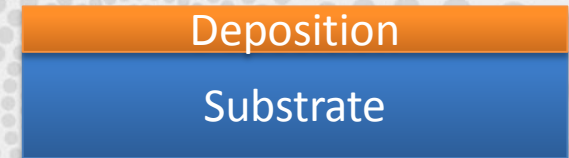
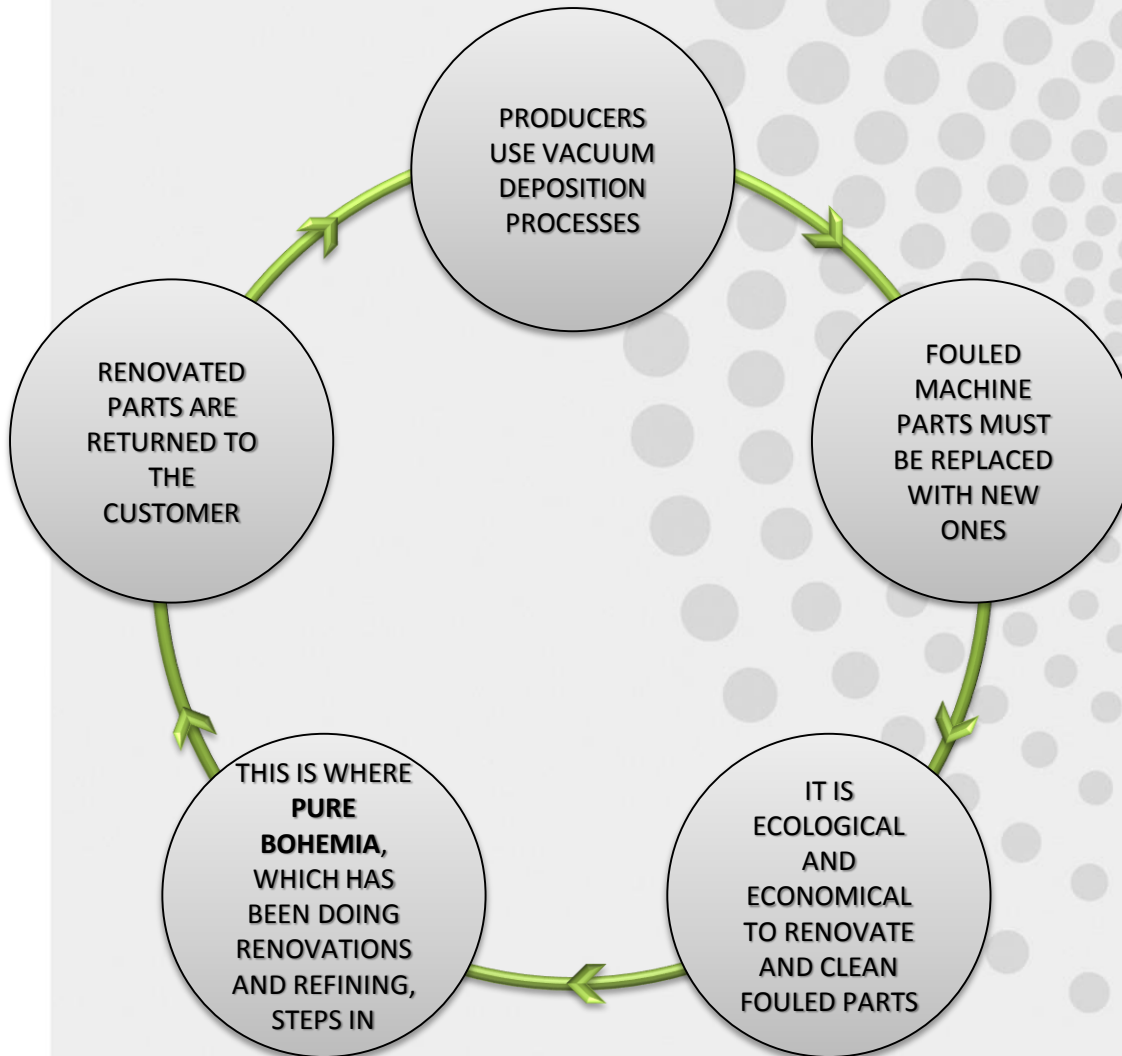
Glass

Thin layers

Research centres



WHY PURE BOHEMIA – RENOVATION



1. Etching of deposition
2. Selective etching of main element in deposition
3. „Under“ etching – substrate attacking

SERVICE EXAMPLES

Removal of aluminium from machine parts and jigs that are used for the car light manufacturing



Cleaning of metal nitrides from jigs for the cutting tool manufacturing



Removal of SiO_2 depositions from sputtering machines



Removal of chrome depositions from aluminium plates



WHY PURE BOHEMIA - REFINING

JIGS AND
MATERIALS
THAT CONTAIN
PRECIOUS
METALS

HIGH VALUE
"WASTE"

IT IS
ECOLOGICAL
AND
ECONOMICAL
TO RECOVER
THIS METAL

WHY

THIS IS WHERE
PURE
BOHEMIA,
WHICH HAS
BEEN DOING
RENOVATIONS
AND REFINING,
STEPS IN

OPERATIONAL
NEEDS
ACCORDING TO
THE ORDER

WHO AND WHERE

PURE METAL
(gold, silver,
indium, etc.)

PROCESSED
MATERIAL AND
WASTE

RESULT

SERVICE EXAMPLES - REFINING

Removal of silver from machine parts and its following refining into silver sand



Removal of depositions that contain gold and its following refining into a high purity condition



Renovation of metal shields for the production of photovoltaic panels; following refining of indium

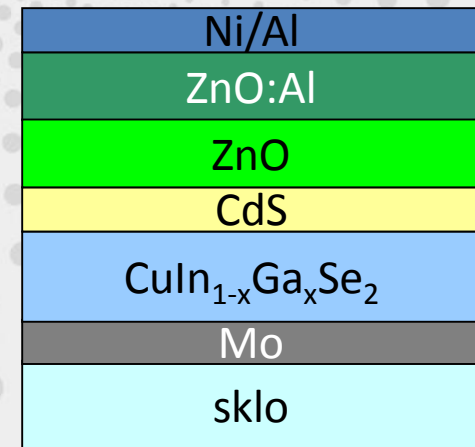


Recovery and refining of precious metals (indium, gallium, ...) from secondary materials of the electronic and the photovoltaic industry

- Project participants
 - UCT Prague (prof. Ing. D. Šnita, CSc.)
 - VÚK – Pure Metals, s.r.o. (Ing. V. Bartoněk)
 - Pure Bohemia, s.r.o. (Ing. T. Jindra, Ph.D.)
- Program ALFA, 1. call - 2011 - 2014
- The Technology Agency of the Czech Republic

PROJECT MOTIVATION

- The high increase in the production of photovoltaic panels before the start of the project
 - Silicon based panels
 - Non-silicon based panels – CI(G)S
- Indium
 - Price at the beginning of 2015 – 750 \$/kg
(price is not stable according to 200 - 300 \$/kg)
 - Use in LCD and LED technologies, slide bearings
 - Classified as one of the 14 critical commodities
- Gallium
 - Price dropped to 200 \$/kg
 - Use in LED technologies
 - Classified as one of the 14 critical commodities



Structure of the CIGS panel

TECHNICAL SOLUTION

1. Selective removal of CIGS mixture deposition
 - Indium / Gallium / Copper / Selenium
2. Metal separation from solution
 - Selenium removing
 - Copper or indium removing
 - Gallium residue
3. Metal refining to high purity
 - Indium refining

SELECTIVE DEPOSITION REMOVAL

- Various substrates

- aluminum alloy
- stainless steel
- plated stainless steel
- copper alloy

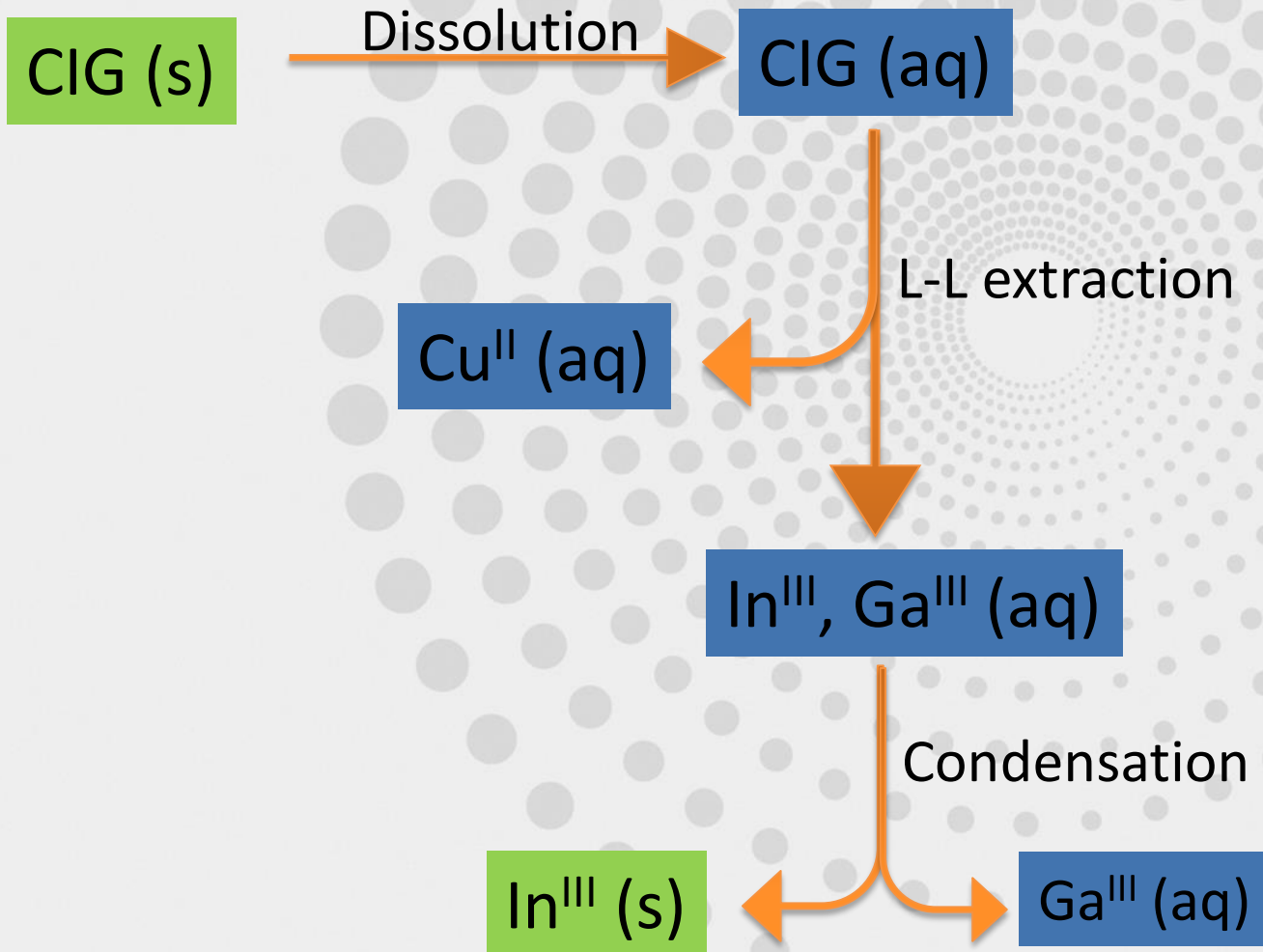


- Various types of deposition

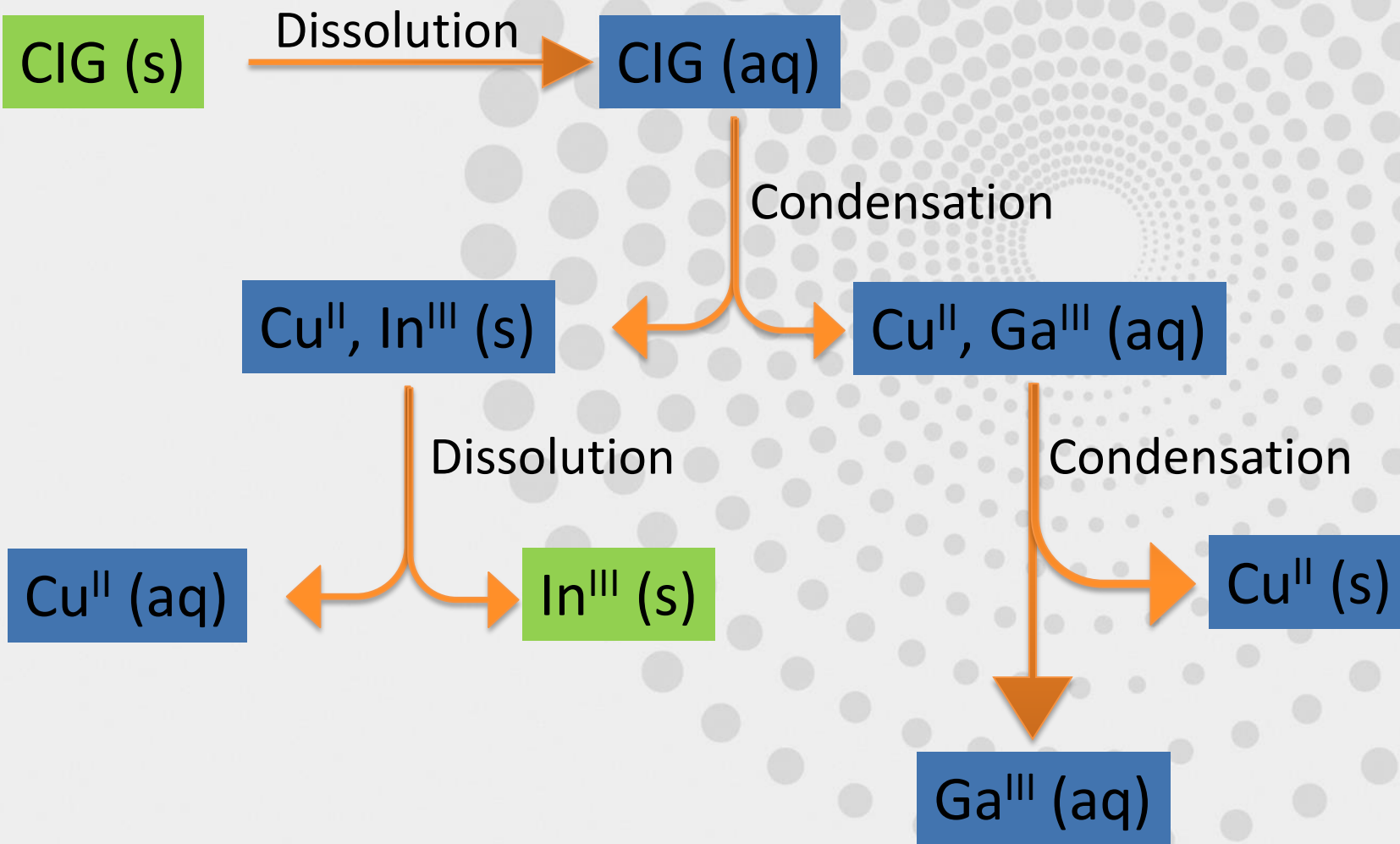
- metallic (partially oxidized) indium with copper
- highly oxidized indium with admixture of copper
- inhomogeneous alloy of indium, copper and gallium
- inhomogeneous alloy of indium, copper, gallium and selenium



SEPARATION OF METALS FROM SOLUTION I.

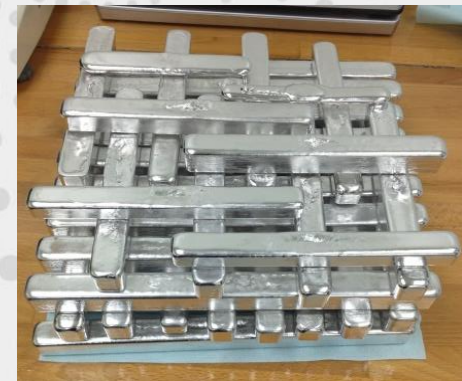
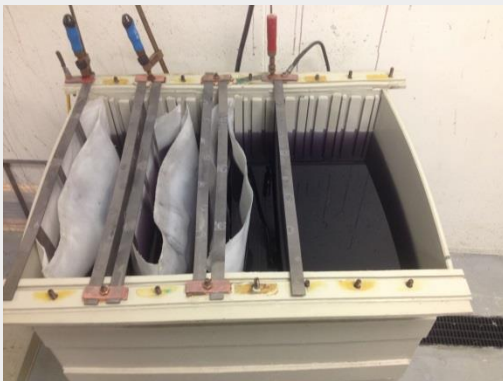


SEPARATION OF METALS FROM SOLUTION II.



METAL REFINING TO HIGH PURITY

1. Conversion an indium salt to a metallic indium
2. Refining of a raw indium to high purity (99,99%, 99,995%, 99,999%)



FORMAL OUTPUTS

- Various functional samples
- Various approved technologies
- 5 utility models
- 2 national patents
 - Using oxalic acid to separation
 - Electrodeposition of metals from suspension of metals salts

Thanks for your attention!