# PSL – WEEK RECYCLE MY PHONE

From Monday 23 November
to Friday 27 november 2020

On-line student conference

Supported by

eit RawMaterials
Connecting matters

This activity has received funding from the European Institute of Innovation and Technology (EIT), a body of the European Union, under the Horizon 2020, the EU Framework Programme for Research and Innovation

# PSL - WEEK

The PSL-week is an interdiscipinary course offered by the different school of PSL University The RecycleMyPhone course addresses the problem of secondary resources, i.e. recycling and urban mining.

It discusses in a technical way the process of chemical extraction of metallic elements from two important streams which are electrical and electronic devices (WEEE) and waste batteries (laptops, cars).

Important aspects of metal recycling and the main thermal (pyrometallurgy) or wet (hydrometallurgy) technologies currently used for the recovery of metals/elements, as well as emerging technologies and industrial risks will be covered.

The course will be taught in English by academic researchers from NTNU (Norway), Chalmers (Sweden), PSL (France) and from the industrial world (ERAMET, Renault, BASF, Suez ...).

For students that need to validate the PSL-Week (3 ECTS) there will be an examination on the last day. This will consist in a short oral presentation of a multiple choice questionnaire to validate their presence at the sessions.

External participants (academic or business) are all welcome but they need to register.

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# PSL - WEEK

WEEE and their chemical content :
What are the chemical elements present in WEEE?; How to build a battery?; Is it worth recycling ? How can we get waste ?
Brief description of the collection and sorting processes.

Thermal methods (pyrometallurgy):
a little bit of thermodynamics, roasting, purification, refining, examples of a heat treatment plant.

Solution chemistry (hydrometallurgy)
The main concepts of solubility, complexation, precipitation separation, adsorption, extraction, visit of a chemical separation plant.

The state of the art of industrial recycling: (Eramet)
Pyrometallurgical processes applied to WEEE; recovery of rare and strategic metals in pyrometallurgical processes; Recycling of lithium batteries by pyrometallurgy compared to hydrometallurgy.

Emergent recycling methods and responsible recycling:
Chemical risks inherent to treatment (heavy metals, toxic volatile compounds, fires); effluent treatment in processes; carbon and energy balance of recycling.

# CONTRIBUTORS


Maxime Balva , Philippe Barboux, Gérard Cote, Domitille Giaume, Virginie Lair, Vincent Semetey, **Chimie Paristech - PSL (France)**
Cyril Aymonier, **CNRS, ICMCB, Bordeaux (France)**
Ragnhild Aune, **NTNU (Norway)**
Martina Petranikova, **Chalmers (Sweden)**
Serge Kimbel, **WEEECycling / Morphosis (France)**
Hannes Wolf, **BASF (Germany)**
Sophie Lebouil, **Eramet (France)**
Caroline Mir, **Renault (France)**
Serge Monturet, **EIT Raw Materials (Europe)**

# PROGRAM

| | | Who | What |
|---|---|---|---|
| Mon 23 | 10h00-10h15 | S. Monturet | Welcome adress from Europe |
| | 10h15-11h45 | P. Barboux | Critical raw materials in Europe |
| | 13h30-15h00 | M. Balva | Urban Mines and take back systems |
| | 15h15-16h45 | M. Petranikova | Hydrometallurgy I |
| Tues 24 | 8h30-10h00 | M. Petranikova | Hydrometallurgy II |
| | 10h15-11h45 | D. Giaume | What can we find in a battery ? |
| | 13h30-15h00 | S. Kimble | Projects of WEEE recycling |
| | 15h15-16h45 | V. Semetey | Innovation in WEEE recycling |
| Wed 25 | 8h30-10h00 | R. Aune | pyrometallurgy |
| | 10h15-11h45 | R. Aune | pyrometallurgy |
| | 14h15-15h15 | C. Aymonier | Supercritical fluids |
| | 15h30-16h30 | V. Lair | Non aqueous methods |
| | 16h45-17h45 | H.Wolf | Recycling at BASF |
| Thurs 26 | 8h30-10h00 | S. Lebouil | Primary and secondary Lithium |
| | 10h15-11h45 | S. Lebouil | Primary and secondary Lithium |
| | 13h30-15h00 | Free work | |
| | 15h15-16h45 | | |
| Friday 27 | 8h30-10h00 | C. Mir | Life Cycle analysis (LCA) methods |
| | 10h15-11h45 | C. Mir | LCA applied to battery recycling |
| | 13h30-15h00 | P. Barboux | Validation examination |
| | | | (10 mn presentation) |
| | | | For those concerned |
| | 15h15-16h45 | | |