SUCCESSFUL EXPERIENCE WITH HORIZON 2020 PROJECTS SUCCESS STORIES IN SC5 AND NMBP PROGRAMMES

INSTITUTE OF NON-FERROUS METALS

RESEARCH NETWORK
ŁUKASIEWICZ

BACKGROUND

- the Institute

- State-owned institute
- The main research centre of non-ferrous industry in Poland
- Almost 500 employees
- Studies of all non-ferrous metals, especially Cu, Al, Zn, Pb
- Certified laboratories
- From laboratory to industrial tests implementation works, experimental production, technical services and consulting
- Close cooperation with industry

BACKGROUND

- the Institute

Areas of expertise

- ❑processing of non-ferrous ores and other mineral resources
- ❑pyrometallurgy
- ❑hydrometallurgy
- ❑analytical chemistry
- ❑processing of metals and alloys
- ❑materials engineering – new materials
- ❑processing of scrap and waste
- ❑environmental protection
- ❑chemical power sources

BACKGROUND

- European aspects

European Technology Platform on Sustainable Mineral Resources

- the ETP SMR) **MISSION** is to develop long-term European Minerals Industries Research and Innovation agendas and roadmaps for action at EU and national level
- the ETP SMR **VISION** is:

- reshape a ‘traditional‘ resource-driven industry to a knowledge-driven industry
- supply and secure the mineral resources needed by the EU economy, while minimizing the related environmental footprint (decoupling)
- strengthen world leadership and competitiveness in minerals sector technology

European Technology Platform on Sustainable Mineral Resources

BACKGROUND

- European aspects

European Innovation Partnership on Raw Materials

- EIP on Raw Materials is a stakeholder platform that brings together representatives from industry, public services, academia and NGOs. Its mission is to provide high-level guidance to the European Commission, Members States and private actors on innovative approaches to the challenges related to raw materials
- EIP on Raw Materials plays a central role in the EU's raw materials policy framework:

- it reinforces the Raw Materials Initiative
- it has been instrumental in securing R&I funding
- developed Strategic Implementation Plan (SIP) to define specific objectives and targets – actions to achieve these include research and development, addressing policy framework conditions, disseminating best practices, gathering knowledge and fostering international cooperation

Raw Material Commitments within EIP Initiative

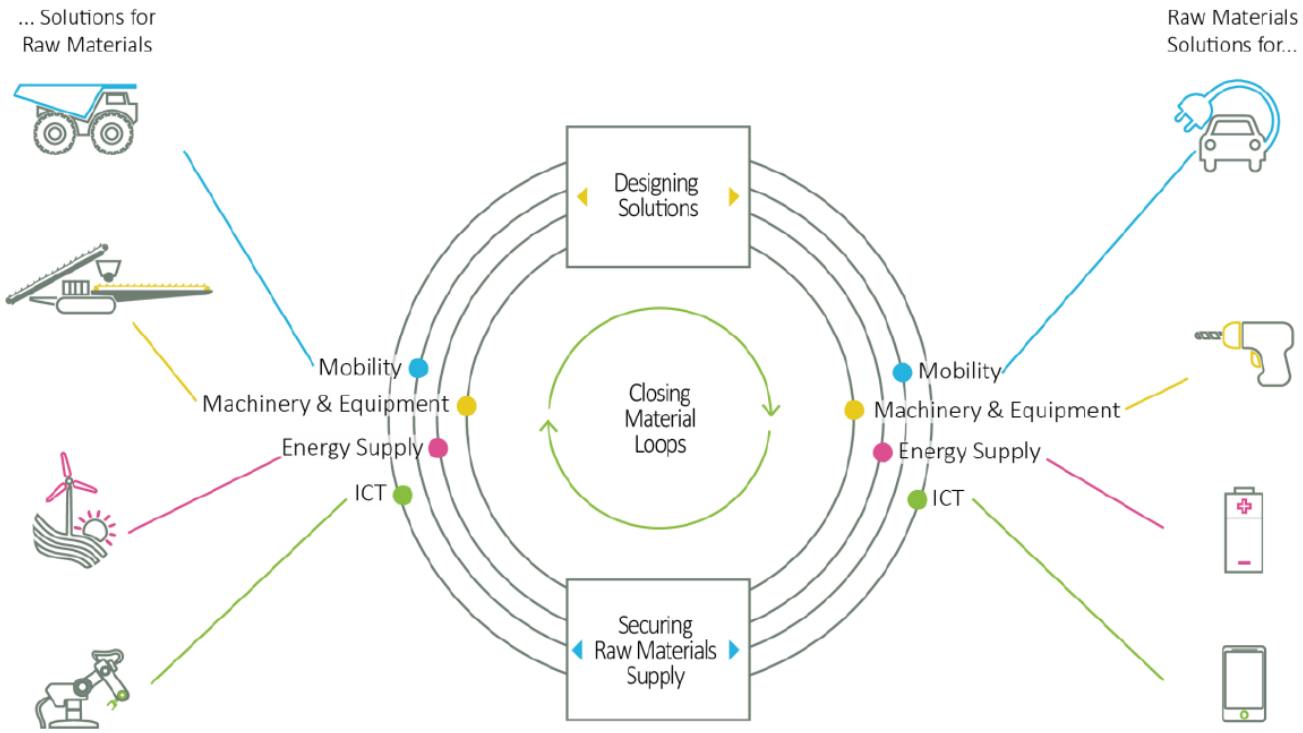
- 80 Raw Material Commitments selected by DG Enterprise
- Łukasiewicz-IMN belongs to 10 „Commitments", i.e.

1. EUROPEM – Creation of a European research network on ore processing and extractive metallurgy, Coordinator – CEA, France
2. BioMOre – BioMOre: An Alternative Mining Concept - Raw Materials Commitment, Coordinator – MIRO, Great Britain
3. EHI – Creation of a European Hydrometallurgical Institute, Coordinator – CEA, France
4. MetGrow – Metal Recovery from Low Grade Ores and Wastes, Coordinator – VTT, Finland
5. MetNet – Metallurgical Pilot Plant Network, Coordinator – SWEREA MEFOS, Sweden
6. PolymetOre – Polymetallic ores processing, Coordinator – Cobre las Cruces, Spain
7. REDEPO – Redefining of deposit potential and improving of technology excellence, Coordinator – EIT+, Poland
8. SecPRIME – Treatment of Primary Raw Materials, Coordinator – Lulea University, Sweden
9. SUBST-EXTREME – Substitution under extreme conditions using powder technological concept, Coordinator – VTT, Finland
10. SX-dev – Valorization of low grade and polymetallic resources: development of innovative hydrometallurgical processes and simulation, Coordinator – ERAMET France

BACKGROUND

- European aspects

KIC Raw Materials – Strategic Goals and Target Markets



Outcome

Projects in Horizon 2020

BioMOre. New Mining Concept for Extracting Metals from Deep Ore Deposits using Biotechnology

- The main goal:

- extracting metals in an economically and ecologically optimized way from deep mineralized zones
- economics
  the increasing shortage of metals in the EU requires new and innovative yet environmentally sustainable mining technologies.
- technology
  BIOMOre objective was to develop an optimized technological concept for in-situ recovering of metals from the surface without the need of establishing an underground infrastructure
- environment
  the BIOMOre concept will reduce the environmental impacts of mining exploitation as a whole and improve chances for better public acceptance.

BIOMOre
An Alternative Mining Concept

BioMOre

- Consortium:

1. Coordinator – KGHM Polska Miedź S.A., Poland
2. MIRO Mineral Industry Research Organisation, United Kingdom
3. AGH, Poland
4. BANGOR University, United Kingdom
5. BUNDESANSTALT FUER GEOWISSENSCHAFTEN UND ROHSTOFFE, Germany
6. Bureau de Recherches Geologiques et Minieres, France
7. COBRE LAS CRUCES, S.A., Spain
8. CNRS CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE, France
9. DMT GmbH & CO. KG, Germany
10. G.E.O.S.INGENIEURGESELLSCHAFT MBH, Germany
11. GTK – GEOLOGIAN TUTKIMUSKESKUS, Finland
12. Hatch Associated Limited, United Kingdom
13. Helmholtz-Zentrum Dresden-Rossendorf EV, Germany
14. ŁUKASIEWICZ - Instytut Metali Nieżelaznych, Poland
15. Kemakta Konsult AB, Sweden
16. KGHM CUPRUM SP ZOO-CBR, Poland
17. KGHM Kupfer AG, Germany
18. MINTEK, Republic of South Africa
19. SELOR EEIG, Netherlands
20. Technische Universitaet Bergakademie Freiberg, Germany
21. TAMPERE UNIVERSITY OF TECHNOLOGY, Finland
22. Umwelt- und Ingenieurtechnik GmbH, Germany
23. VTT, Finland

- Topic: SC5-11a-2014
- Type of action: Research and Innovation Action

ADIR. Next generation urban mining - Automated disassembly, separation and recovery of valuable materials from electronic equipment

- The main goal:
- to develop technology and a machine concept for selective disassembly of printed circuit boards and mobile phones
- to produce sorting fractions with high amounts of valuable materials subsequently recovered by hydrometallurgical processes

- The machine concept is based on:
- image processing
- robotic handling
- pulsed power technology
- 3D laser measurement
- real-time laser material identification (to detect materials)
- laser processing (to access components, to selectively unsolder these; to cut off parts of a printed circuit board)
- automatic separation into different sorting fractions

ADIR

- Consortium:

1. Coordinator: Fraunhofer-Gesellschaft zur Foerderung der Angewandten Forschung E.V, Niemcy
2. Łukasiewicz - Instytut Metali Nieżelaznych, Polska
3. Electrocycling GmbH, Niemcy
4. Pro Automation GmbH, Austria
5. SAS I-CUBE RESEARCH, Francja
6. Osai AS, Włochy
7. Lsa-Laser Analytical Systems & Automation GmbH, Niemcy
8. H.C. STARCK GmbH, Niemcy
9. Aurubis AG, Niemcy

- Topic: H2020-SPIRE-2015
- Type of action: Innovation Action

INTMET Integrated innovative metallurgical system to benefit efficiently polymetallic, complex and low grade ores and concentrates

- The main goal:

- to develop a new and efficient technology to deal with low-grade, complex ores which will change the current and future operations of mineral deposits (including recycling of metals in tailings and metallurgical wastes)
- to work out a new mining (mine-to-metal) business model based on the technology breakthroughs
- the new business model contributes to a more sustainable management of land and the minerals by reducing environmental impacts, increasing the efficiency of the resources (less energy, less water needed) and by valorizing valuable metals currently discarded

Cu Ag Pb Zn Au In
Int-Met
Integrated Metallurgy

INTMET

- Consortium:

1. Coordinator: Cobre Las Cruces SA, Spain
2. KGHM Polska Miedz SA, Poland
3. Rudarsko-topionicarski basen Bor - Grupa, Topionica i rafinacija bakra Bor d.o.o. u restruktuiranju, Serbia
4. Somincor - Sociedade Mineira de Neves-Corvo, S.A. Portugal
5. Outotec (Finland) Oy, Finland
6. TECNICAS REUNIDAS SA, Spain
7. ŁUKASIEWICZ - Instytut Metali Nieżelaznych, Poland
8. MINTEK, Republic of South Africa
9. Institut Za Rudarstvo i Metalurgiju Bor, Serbia
10. Bureau de Recherches Geologiques Et Minieres, France
11. AGQ Mining & Bioenergy SL, Spain
12. Institutul National de Cercetare - Dezvoltare Pentru metale Neferoase si Rare - IMNR Romania
13. Guenter Tiess, Austria

- Topic: SC5-11e-2015
- Type of action: Research and Innovation Action

METGROW PLUS. Metal Recovery from Low Grade Ores and Wastes Plus

- The main goal:

- METGROW+ addresses and solves bottlenecks in the European raw materials supply by developing innovative metallurgical technologies for unlocking the use of potential domestic raw materials
- economically important nickel-cobalt deposits and low grade polymetallic waste, iron containing sludges (goethite, jarosite etc.) which are currently not yet being exploited due to technical bottlenecks, are in focus
- concurrently, METGROW+ targets innovative hydrometallurgical processes to extract important metals including Ni, Cu, Zn, Co, In, Ga, Ge from low grade ores in a cost-effective way

METGrow

METGROW PLUS

- Consortium:

1. Coordinator – VTT, Finland
2. ARCHE CVBA, Belgium
3. Optimizacion Orientada a la Sostenibilidad SL, Spain
4. IDP Ingenieria y Arquitectura Iberia SL, Spain
5. ŁUKASIEWICZ - Instytut Metali Nieżelaznych, Poland
6. Katholieke Universiteit Leuven, Belgium
7. JM Recycling NV, Belgium
8. Outotec, Finland
9. SP Sveriges Tekniska Forskningsinstitut AB, Sweden
10. Fundacion Tecnalia Research & Innovatio, Spain
11. The Research Committee of The Technical University of Crete, Greece
12. Universiteit Gent, Belgium
13. Vlaamse Instelling Voor Technologisch Onderzoek N.V., Belgium
14. Hellenic Copper Mines Ltd., Cyprus
15. Urbaser S.A., Spain
16. PROFIMA Sp. z o.o., Poland
17. UMICORE, Belgium
18. D'APPOLONIA SPA, Italy
19. KERNEOS SA, France

- Topic: SC5-11e-2015
- Type of action: Research and Innovation Action

FineFuture Innovative technologies and concepts for fine particle flotation: unlocking future fine-grained deposits and Critical Raw Materials resources for the EU

- The main goal:

- to develop flotation technologies which will work adequately for **fine particles,** below 20 µm in size. This is a serious challenge at present limiting the exploitation of deposits and proper recycling of end of life products containing Critical Raw Materials (CRM)
- the developed technology will not only help unlock new CRM deposits but also contribute to increase the resource and energy efficiency of current operations where the fines are lost to tailings
- FineFuture will also enable proper reprocessing of old tailings deposits and be technology-transferred to other raw material particle-based processes within the circular economy

FineFuture

- Consortium:

1. HELMHOLTZ-ZENTRUM DRESDEN-ROSSENDORF EV - HZDR, Germany
2. BASF SE, Sweden
3. KGHM POLSKA MIEDZ SA, Poland
4. MAELGWYN MINERAL SERVICES LIMITED, United Kingdom
5. ELLINIKI LEFKOLITHI ANONYMOS METALLEFTIKI VIOMIHANIKI NAFTILIAKI KAI EMPORIKI ETERIA - Grecian Magnesite SA, Greece
6. ERAMET IDEAS - ERAMET IDEAS, France
7. MAGNESITAS NAVARRAS SA, Spain
8. TURBOFLOTSERVICE, Ukraine
9. INDUSTRIAL MINERALS ASSOCIATION EUROPE - IMA EUROPE, Belgium
10. UNIVERSITE DE LORRAINE - UL, France
11. SOFIA UNIVERSITY ST KLIMENT OHRIDSKI - UNISOFIA, Bulgaria
12. ARISTOTELIO PANEPISTIMIO THESSALONIKIS - ARISTOTLE UNIVERSITY OF THESSALONIKI, Greece
13. ŁUKASIEWICZ - Instytut Metali Nieżelaznych, Poland
14. IMPERIAL COLLEGE OF SCIENCE TECHNOLOGY AND MEDICINE, United Kingdom
15. POLITECNICO DI MILANO - POLIMI, Italy
16. ISTANBUL TEKNIK UNIVERSITESI - ITU, Turkey

- Topic: SC5-09-2018-2019
- Type of action: Research and Innovation Action

MSP-REFRAM Multi-Stakeholder Platform for a Secure Supply of Refractory Metals in Europe

- The main goal:

- to create a common multi-stakeholder platform that will draw the current refractory metals value chains (tungsten, tantalum, rhenium, molybdenum and niobium) and identify its innovation potential to support implementation of the EIP on Raw Materials
- the outputs of MSP-REFRAM will help Europe improve the supply value chain of refractory metals in the coming years, optimising the use of external resources as energy and water and at the same time reducing the amount and the toxicity of waste
- MSP-REFRAM shares its conclusions widely and efficiently, in a long lasting way thanks to the support of the PROMETIA association

MSP REFRAM

MSP-REFRAM

- Consortium:

1. Commissariat A L Energie Atomique et aux Energies Alternatives, France
2. Amphos 21 Consulting SL, Spain
3. Bureau De Recherches Geologiques Et Minieres, France
4. Fundacion Cartif, Spain
5. Chalmers Tekniska Hoegskola AB, Sweden
6. E-MINES, France
7. ERAMET Research, France
8. Geologian Tutkimuskeskus, Finland
9. Universidad De Burgos, Spain
10. Optimizacion Orientada A La Sostenibilidad SL, Spain
11. ŁUKASIEWICZ - Instytut Metali Nieżelaznych, Poland
12. Agencia de Innovacion Y Financiacion Empresarial de Castilla y Leon, Spain
13. Technische Universitaet Kaiserslautern, Germany
14. Lappeenrannan Teknillinen Yliopisto, Finland
15. Institut National Polytechnique De Toulouse, France
16. SWEREA MEFOS AB, Sweden
17. National Technical University of Athens - NTUA Greece
18. Technische Universiteit Delft, Holand
19. Teknologian tutkimuskeskus VTT Oy, Finlandia
20. LGI CONSULTING SARL, France
21. Mineral Processing and Extractive Metallurgy for Mining and Recycling Innovation Association, Belgium

- Topic: WASTE-4d-2015
- Type of action: CSAction

SCRREEN Solutions for CRitical Raw materials - a European Expert Network

- The main goal:

- to establish an EU Expert Network that covers the whole value chain for current and future critical raw materials. It will build on existing structures and initiatives, as well as international collaboration, and will aim at clustering related EU projects and initiatives
- to identify the knowledge gained over the last years and ease the access to these data widely and efficiently, beyond the project
- SCRREEN collectw and organises all of the data generated in other projects, associations, initiatives etc., and develops a knowledge data portal.

SCRREEN

SCRREEN

- Consortium:

1. Commissariat A L Energie Atomique et aux Energies Alternatives, France
2. ASSOCIATION FRANCAISE DE NORMALISATION - AFNOR, France
3. Amphos 21 Consulting SL, Spain
4. BUNDESANSTALT FUER GEOWISSENSCHAFTEN UND ROHSTOFFE - BGR, Germany
5. UNITED KINGDOM RESEARCH AND INNOVATION - UKRI, United Kingdom
6. Bureau De Recherches Geologiques Et Minieres, France
7. ENCO SRL - ENCO SRL, Italy
8. Chalers Tekniska Hoegskola AB, Sweden
9. AGENZIA NAZIONALE PER LE NUOVE TECNOLOGIE, L'ENERGIA E LO SVILUPPO ECONOMICO SOSTENIBILE - ENEA, Italy
10. FRAUNHOFER GESELLSCHAFT ZUR FOERDERUNG DER ANGEWANDTEN FORSCHUNG E.V. - Fraunhofer, Germany
11. GEOLOSKI ZAVOD SLOVENIJE - GeoZS, Slovenia
12. Geological Survey of Denmark and Greenland - GEUS, Denmark
13. GEOLOGIAN TUTKIMUSKESKUS - GEOLOGICALSURVEY OF FINLAND, Finland
14. UNIVERSIDAD DE BURGOS - UBU, Spain
15. OPTIMIZACION ORIENTADA A LA SOSTENIBILIDAD SL - IDENER, Spain
16. LUKASIEWICZ - INSTYTUT METALI NIEZELAZNYCH - IMN, Poland
17. KNOWLEDGE TRANSFER NETWORK LIMITED - KTN, United Kingdom
18. UNIVERSITEIT LEIDEN - ULEI, The Netherlands
19. LGI CONSULTING - LGI, France
20. MINPOL GMBH - MinPol, Austria
21. PNO INNOVATION, Belgium
22. SVERIGES GEOLOGISKA UNDERSOKNING - SGU, Sweden
23. Swerim AB - Swerim AB, Sweden
24. FUNDACION TECNALIA RESEARCH & INNOVATION - TECNALIA, Spain
25. NATIONAL TECHNICAL UNIVERSITY OF ATHENS - NTUA - NTUA, Greece
26. TECHNISCHE UNIVERSITEIT DELFT - TU Delft, The Nerherlands
27. UNITED NATIONS UNIVERSITY - UNU, Japan
28. Teknologian tutkimuskeskus VTT Oy - VTT, Finland
29. ECODOM-CONSORZIO ITALIANO PER IL RECUPERO E RICICLAGGIO ELETTROD - ECODOM, Italy
30. JRC -JOINT RESEARCH CENTRE- EUROPEAN COMMISSION - JRC, Belgium

- Topic: SC5-15-2016-2017
- Type of action: CSAction

Projects in EIT RawMaterials

Participation in 18 projects:

- 6 Upscaling projects (IMN as a Coordinator in 4 of them)
- 8 Networks of Infrastructure
- 3 Lifelong Learning projects
- 1 Info Center

Upscaling Projects

RIGaT. Recovery of Indium, Germanium and Tin

- The main goal:
- to create a solution for recovery of critical metals, such as indium and germanium, and increase production of base metals, i.e. tin, from polymetallic alloys formed in the production of zinc and lead by Imperial Smelting Process in zinc smelters
- Upscaling and validation of the technology developed by project partners for production of indium and germanium concentrates and further refining of the critical metals

- Project consortium:
- Coordinator: ŁUKASIEWICZ - IMN
- Huta Cynku Miasteczko Śląskie S.A.
- FNE Entsorgungsdienste Freiberg GmbH
- Technische Universität Bergakademie Freiberg (TUBAF)
- Teknologian tutkimuskeskus VTT (Technical Research Centre of Finland Ltd. VTT)

Upscaling Projects

SlagVal. Slag valorisation for multi metal recovery and mineral resource production

- The main goal:
- provide ready for implementation solution for growing challenge of waste management in companies which produce white slag by complete transformation of its volume into construction material
- eliminate the environmentally hazardous material, and at the same time provide additional profit to the companies thanks to the recovery of base (Zn, Pb, Cu) and by-product (Ag, Sb, Sn) metals which are contained therein
- Project consortium:
- Coordinator: ŁUKASIEWICZ - IMN
- Baterpol S.A.
- Küttner GmbH & Co. KG
- Rheinisch-Westfaelische Technische Hochschule Aachen, RWTH Aachen
- BERZELIUS Stolberg GmbH
- Vlaamse Instelling voor Technologisch Onderzoek NV (VITO)

Upscaling Projects

TiSPHERO. Manufacturing of spherical powders from scraps for special applications

- The main goal:
- upscale and launch on the market innovative technology based on plasma spheroidization for production of spherical powders from low cost titanium scraps, i.e. chips produced during mechanical treatment of titanium based structural components – waste material generated by European companies,.
- demonstration of applicability of developed products for the specific target, i.e. production of spherical powders for modern technologies of Additive Manufacturing
- Project consortium:
- Coordinator: ŁUKASIEWICZ - IMN
- CERTECH Sp. z o.o.
- K3D B.V.
- Politecnico di Milano
- Teknologian tutkimuskeskus VTT (Technical Research Centre of Finland Ltd. VTT)

Upscaling Projects

3DMPWIRE. Material-efficient Cu wire-based 3D printing technology

- The main goal:

- develop technology for manufacturing of components made of Cu-based alloys, such as water turbine propellers, ship propellers, seawater pump elements and other marine equipment, by means of Wire+Arc Additive Manufacturing (WAAM) or more precisely the 3D Metal Printing (3DMP®) technology
- the 3DMP® technology is considered as the most promising technique for such applications and due to its advantages will be competitive and more environmental friendly than the presently used conventional metal processing technologies

- Project consortium:

- Coordinator: ŁUKASIEWICZ - IMN
- Agenzia Nazionale per le Nuove Tecnologie, l'Energia e lo Sviluppo Economico Sostenibile (ENEA)
- Fundación Tecnalia Research & Innovation
- Gefertec GmbH
- Ghent University

THANK YOU FOR YOUR ATTENTION

RESEARCH NETWORK
ŁUKASIEWICZ