FAME
Flexible And Mobile Economic Processing Technologies

Connecting cross European expertise to engage domestic mining

Machado Leite - LNEG

FAME – FLEXIBLE AND MOBILE ECONOMIC PROCESSING TECHNOLOGIES

- Horizon 2020
- Budget: 7,5 Mio €
- Project Lifetime: Jan 2015 – Dec 2018
- 17 Partners from 8 different European countries
- Coordination and Management: Wardell Armstrong Int. (London) and Geokompetenzzentrum Freiberg e.V.

GTK · NATURAL HISTORY MUSEUM · EUROPEAN metals · GEOKOMPETENZ · wardell armstrong · LNEG · LULEÅ TEKNISKA UNIVERSITET · G.E.O.S. INGENIEUR-GESELLSCHAFT MBH · U.PORTO · UNIVERSITY OF EXETER · UNIVERSITÉ DE LORRAINE · GBM · brgm · COLT resources · KELIBER

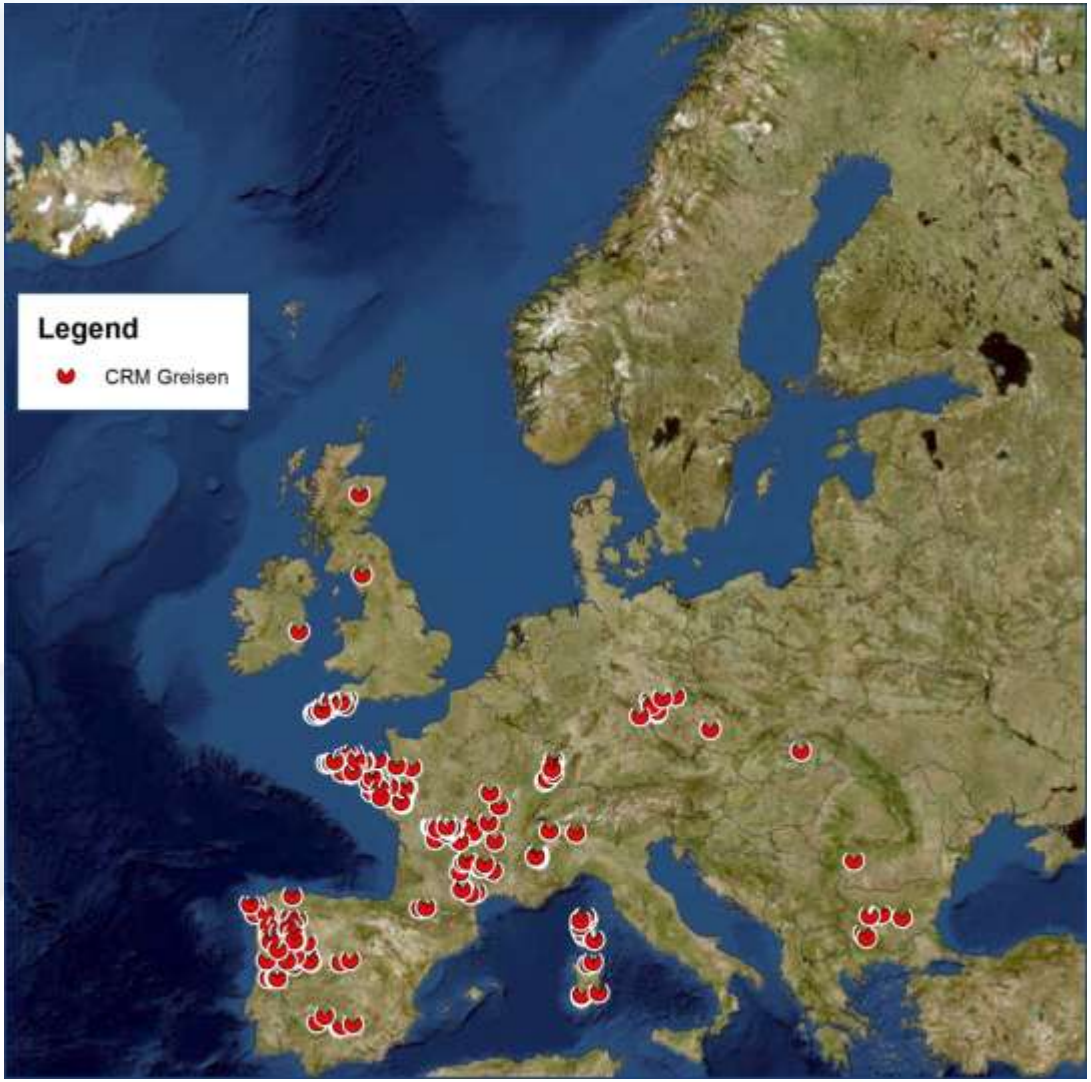
TARGETING SPECIFIC DEPOSIT TYPES CRM FOCUS

Variscan Ore Deposits

Selected 6 References Deposits for sampling

- Skarns
- Pegmatites / Greisens
- W, Sn, Li, … Ta, Nb, Be, Ge, Ga, Cu, Zn … fluorspar

- Complex mineralogy
- Frequently small and poorer resources not economically viable



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FAME'S OBJECTIVES

- To **increase the competitiveness** of European mining enterprises (especially SMEs).
- To develop **flexible and mobile technologies** customized to promising European mineral deposit types, compliant with environmental and legislative constraints.
- To **validate the technologies** developed and to demonstrate their capabilities in operational environments and different ore deposits.
- To **stimulate private engagement and investment** in the European mining sector.

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FAME AT A GLANCE

WP7 Dissemination Exploitation of Knowledge

Greisen | Skarn | Pegmatites

WP2 Economic potential of skarn, pegmatite and greisen ore deposits and requirements for profitable mining, Mineralogical variables significant for process flow design

WP3 Flowsheet and basic engineering of flexible technology for greisen-pegmatitic ore processing; Concentrate upgrading, lithium and metallic by-product recovery

WP4 Flowsheet and basic engineering of flexible technology for skarn ore processing Concentrate upgrading, by-product recovery and utilization of rejects

WP5

Energy savings in physical mineral liberation + Enhancement of separation contrast for better flotation recovery + Intensification of the processes + (Bio-) Leaching using fine grain activation

Engineering and design at TRL5 of flexible, modular, economic and environmental friendly processing of skarn and greisen ores, at TRL 6 (mobile) of pegmatites incl. recovery of strategic elements

WP6 Smaller socio-ecological footprint for marketing European resources at a global scale, "clean mining" + more raw material awareness and public acceptance

Generation
Explore and Distribute
Marketing Plan

Dissemination
Public Awareness
Maximising Impact
Education

FAME Outcomes:

New flotation reagents for oxidic minerals
Optimized flotation regimes
New flotation cells for very fine grain flotation
Modular equipment supply on Build Own Operate

Enhanced pre-processing, fragmentation, sorting
Viability of bioagglomeration, bioflotation
Rapid techno-economic appraisals of mineral deposits
Valorisation of residues, Recovery of strategic elements

Exploitation
Market Analysis
IPR management plan
Business plan

PERFORMANCE INCREASE 10 TO 20% → HIGHER MARKETABLE CONCENTRATE → STIMULATING MINING + ATTRACTING INVESTORS

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Role Activities

Academia
- Knowledge generation
- In-house Basic Research
- Providing R&D Infrastructure
- Innovation by R&D
- Technology watch
- Scientific publications

Research
- Applied Research
- New methodology
- Added value through cooperation by integration of project results
- Know-how transfer
- Intensification

Service
- Valorisation
- Business plan for Marketing and Commercialisation
- Practical Business Know-how Transfer

Production
- Identification of need of action
- Granting access rights to reference sites and to data
- Sampling support
- Catalysing research cooperation and implementation of results

Exploitation

- Disclosure of project results in the academic field
- Education and training
- Identification of new target end-user groups
- Internationalisation of results

- Commercial exploitation of results by new R&D
- Exploitation via ETPs - access to EU R&D and industrial panels
- Integration of project results on national and international fora

- Business field enlargement
- Market expansion
- Development of ore deposits
- Enhanced engagement in mining projects (up to establishing of mining enterprises).

- Investment in mining
- Development of ore deposits
- Development of new products
- Foundation of enterprises
- Securing EU Raw Material Base

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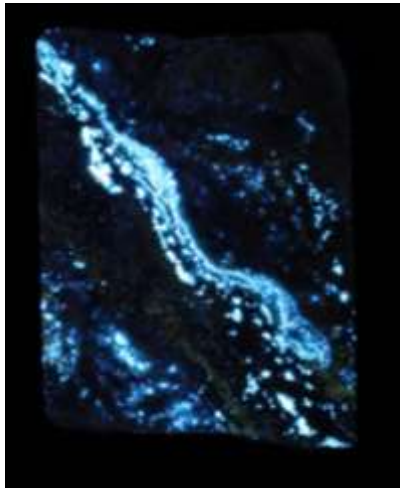
WP2 – DEPOSIT MINERALOGY

- Characterise the total mineralogical diversity and occurrence of specific elements and materials within the reference ore types
  - Maximum recovery
- Understand the spatial characteristics of that mineralogy
  - Grain size, morphologies, modal quantities and spatial distribution (textural and structural)
- Support further research to develop flexible and economically viable mineral separation
- Using advanced lab techniques (EPMA, QEM Scan, Micro-imaging, XRD, ….)



WP3, WP4 and WP5 PROCESSING
Shortcomings and main bottlenecks of technology

- **Reflexion on Liberation:**
  - Gangue minerals liberation at crushing sizes
    - Technical feasibility of Pre-Concentration
  - Valuable minerals liberation
    - Coarse liberation
    - Fine liberation
    - Liberation distributed along size range
- **Comminution**
  - Crushing – preliminary comminution leading to gangue liberation
  - Coarse Grinding – coarse liberation
  - Grinding – for valuable minerals liberation
  - Re-Grinding with “unit cells” in the circulating load - distributed liberation
- **Sulphides removal**
  - Coarse liberation – after gravity concentration, using film flotation (!?)
  - Fine liberation – by froth flotation before gravity concentration
- **Slimes processing**
  - Centrifugal gravity separation
  - Cassiterite/Wolframite flotation

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WP 6 ENVIRONMENTAL & SOCIOPOLITICAL ASSESSMENTS

Utilization of processing rejects
Environmental and social-political assessment assessment (economic)

Fact finding British Fluorspar Glebe Mine, Peak - District National Park 16.-18.6.2015

WP7 – DISSEMINATION AND EXPLOITATION MANAGEMENT

Intellectual Property Rights Management

- Previous background from participantes to protec if needed
- Identifying new intellectual property for protection

Innovation Management

- Market review and market analysis

Exploitation Management

- Supporting exploitation activities per partner
- Monitoring exploitation, development of commercial exploitation and business plan

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Thanks for your attention

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