

# A novel biobased flotation process

## Presenter

Katerina Hruzova, LTU

## Project leader

Ulrika Rova, LTU

## Partners

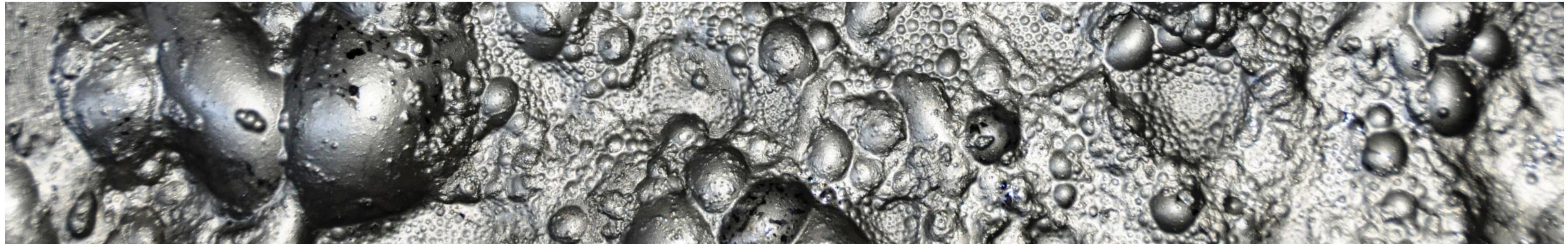
Luleå University of Technology, Boliden Mineral AB, Nouryon

## Project duration

2019 - 2022



# Background - A novel biobased flotation process



Due to the importance of the Swedish mining industry, access to metals recovery through sustainable processes based on bio-based chemicals is an important key for creating a completely fossil-free and a more environmentally friendly mining and mineral industry.

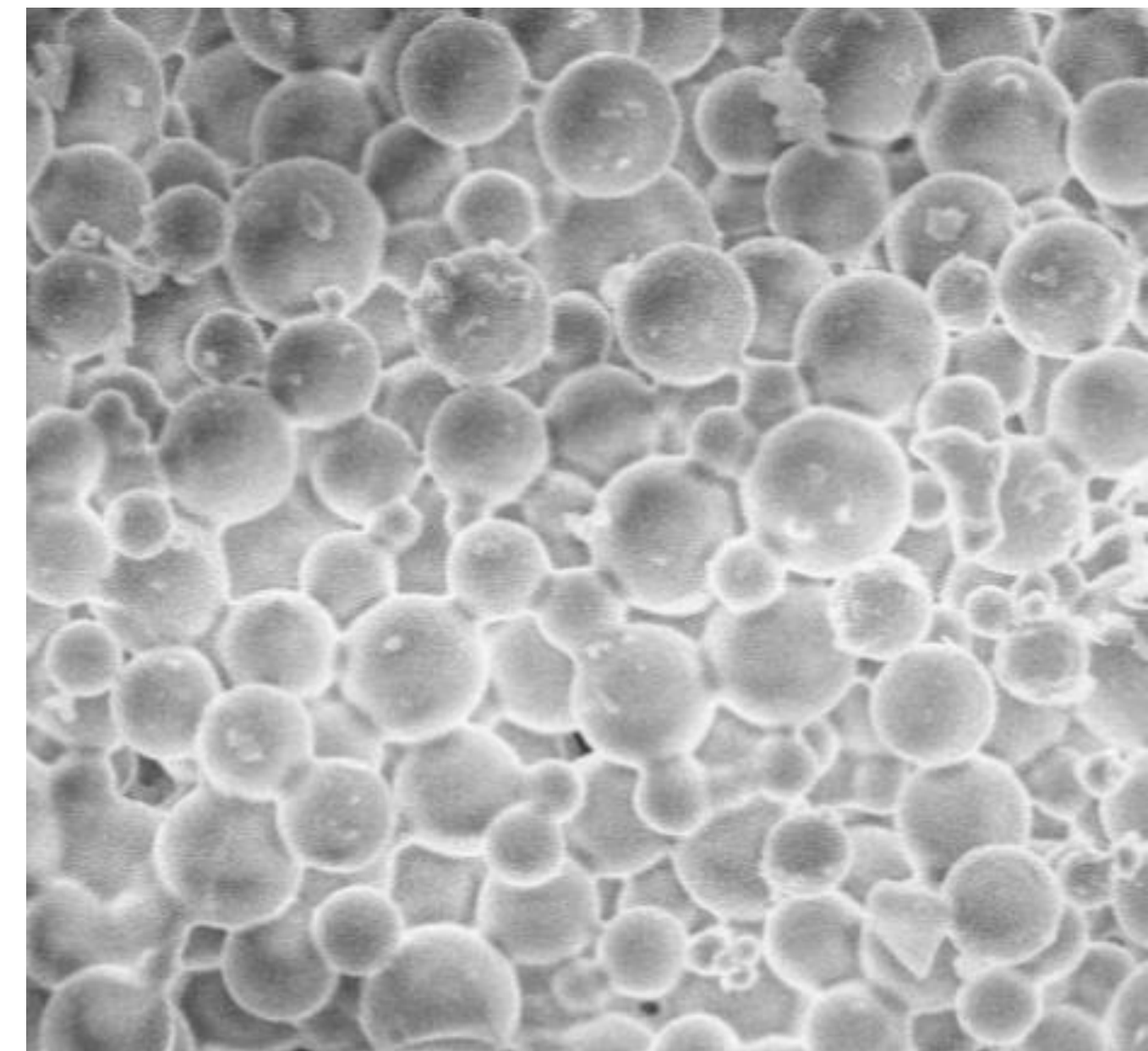
Driving force:

- Replacement for the xanthate-based flotation – secure access and decreased import dependence
- Secure supply and quality
- Low environmental impact
- Demonstrating synergism between two important Swedish industrial sectors (forestry, mining)





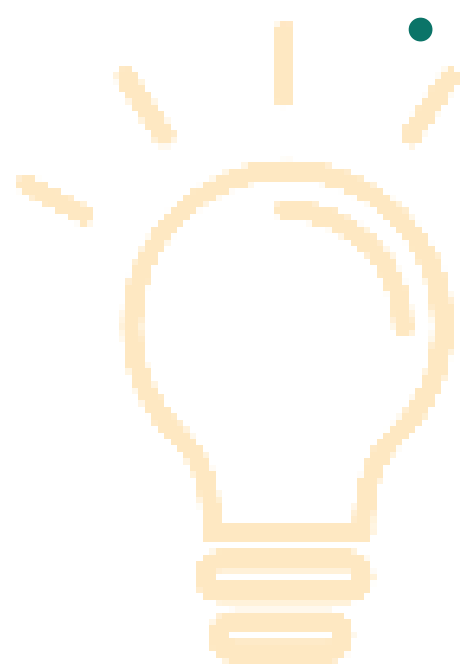
# Use of organosolv lignin hydrophobic nanoparticles as biodegradable flotation reagents (LIGNOFLOT)





# Outcome – Main conclusions

- The potential of the new flotation reagent, OLP, has been verified at **TRL7**
- The new OLP reagent concept improved the flotation performance for copper significantly. The grades were similar to the xanthate control, while the **selectivity** improved, and the **recovery** was higher.
  - The OLP system resulted in 11.5% increase in recovery of copper in the final concentrate compared to the control.
  - The OLP concept could significantly decrease the use of xanthates by more than 80%.
- **Very small amounts of OLP** (1-5 g/ton) are required for the process to maintain the selectivity and improve the copper recovery.



# Impact

Technoeconomic and environmental assessments, verified that the concept has the potential to increase the revenue significantly, while at the same time contribute to the development of a sustainable reagent that enables valorization of residual forest materials and a more eco-friendly mining sector.

- Lower consumption of xanthates in the flotation.
- Removal of lime from the flotation process -> lower CO<sub>2</sub>
- No need for iron (pyrite) depressants



# Sequence of projects

- Pre-study with Organosolv lignin particles started in 2018 with *Boliden Mineral AB*.
- Based on the results 2 full scale projects were started in 2019/2020
  - SIP STRIM: **LIGNOFLOT** (Swedish consortium) – *Boliden Mineral AB, Nouryon, LTU*
  - EIT RawMaterials: **BATTERFLAI** (Supply of BATTERy minerals using lignin nanoparticles as FLOTation collectors), (European consortium)
    - Mining industry: *Boliden Mineral AB, KGHM Poland, Hellas Gold*
    - Research partners: *RISE, INM, KGHM Cuprum, NTUA, LTU*
    - Others: *ColloidTek OY, LTU Business*
- Small industrial scale-ups were performed in the LIGNOFLOT and BATTERFLAI (30L flotation).

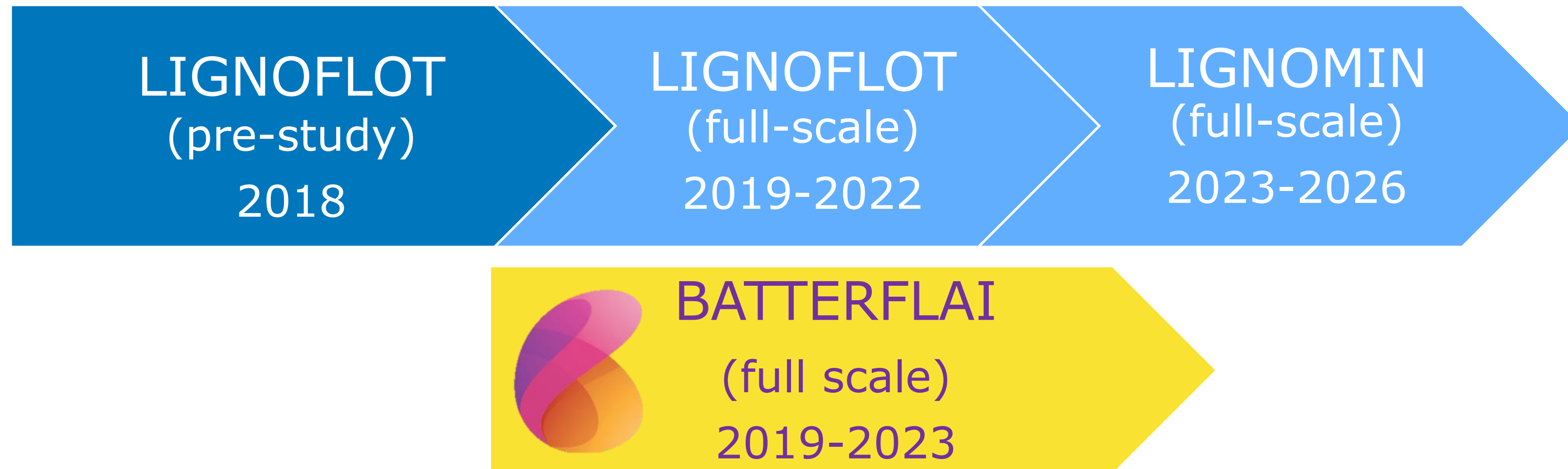


# The Future

## OBJECTIVES of LIGNOMIN

1. Produce and characterize a portfolio of lignin particles from different non-fossil-based resources (**agricultural and agro-industrial residues** as well as available **technical lignins**) – possibility to tailor the lignin reagent for the ore sample and sufficient supply guaranteed.
2. Assess the efficiency of the produced lignin particles for selective recovery of valuable minerals at high grade from different sulphide ore.

Laboratory scale experiment will be transferred into continuous flotation circuit in cooperation with Oulu University



# Mining innovation for a sustainable future