

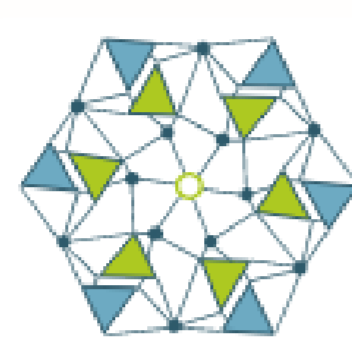
UNIVERSITY  
OF OULU

# Removal of sulphate from cold mining waters

Chemical Process Engineering, University of Oulu

**Kolarctic CBC**

EU FINLAND NORWAY RUSSIA SWEDEN



ФЕДЕРАЛЬНЫЙ ИССЛЕДОВАТЕЛЬСКИЙ ЦЕНТР  
КОЛЬСКИЙ НАУЧНЫЙ ЦЕНТР  
РОССИЙСКОЙ АКАДЕМИИ НАУК



TROMS fylkeskommune  
ROMSSA fylkkesuohkan



REGIONAL COUNCIL  
OF LAPLAND



Nordland  
FYLKESKOMMUNE



REGION  
NORRBOTTEN

## Research objectives

- Development of novel biosorbents for sulphate removal
- Regeneration of used biosorbents
- Simultaneous biological sulphate reduction and metal ions recovery as metal sulphides
- Utilisation of organic wastes as carbon sources for sulphate reducing consortium

## Results

- High sulphate sorption capacity of  $189.5 \pm 2.7$  mg/g under acidic conditions with aminated peat.

*Aminated peat biosorbent developed for sulphate sorption.*



- Enriched sulphate reducing bacterial consortium able to reduce sulphate at  $6^\circ\text{C}$  with succinate as a carbon source.



Before inoculation

After inoculation

After one week of cultivation at  $6^\circ\text{C}$

After two weeks of cultivation at  $6^\circ\text{C}$

*Biological sulphate reduction is observed by the formation of black iron sulfide in synthetic mining water.*

## Publications

- Gogoi H, Leiviskä T, Rämö J & Tanskanen J. (2019) Production of aminated peat from branched polyethylenimine and glycidyltrimethylammonium chloride for sulphate removal from mining water. *Environmental Research* 175: 323-334.
- Virpiranta H, Taskila S, Leiviskä T, Rämö J & Tanskanen J. (2019) Development of a process for microbial sulfate reduction in cold mining waters – Cold acclimation of bacterial consortia from an Arctic mining district. *Environmental Pollution* 252: 281-288.

## Projects

COSUMA – Comprehensive Sulfate Management in Cold Mining Waters

- 9/2016 - 8/2020
- Funded by the Academy of Finland

SEESIMA – Supporting Environmental, Economic and Social Impacts of Mining Activity

- 10/2018 - 9/2021
- Funded by the Kolarctic CBC Programme

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