

Sustainable processing of phosphate rock

Summary

The project is aimed at solving vital environmental and economical issues – developing phosphate rock processing technologies. The most promising and environmentally least harmful methods for phosphate rock valorization are elaborated, focusing also on the extraction possibilities of valuable rare earth elements.

Research field:	Chemical, materials and energy technology
Supervisors:	Prof. Dr. Andres Trikkel Dr. Kaia Tõnsuaadu
Availability:	This position is available.
Offered by:	School of Engineering Department of Materials and Environmental Technology
Application deadline:	Applications are accepted between June 01, 2020 00:00 and July 03, 2020 23:59 (Europe/Zurich)

Description

Estonia has large unexploited phosphate rock reserves, the total amount being about 700 million tons of P₂O₅. Currently, the reserves are not used due to concerns about social and ecological impact of phosphate rock mining and processing. At the same time the European Commission has defined phosphorite ore as a critical raw material with significant supply risk. In addition, Estonian phosphorite contains valuable rare earth elements, also belonging to the list of critical raw materials and necessary for future electronic applications. Therefore, phosphorite is of great economic importance, both locally and in the EU context. So, the novelty and actuality of these studies is clearly seen. The current PhD studies will be focused on studying and developing zero-waste phosphorite ore beneficiation and processing methods, which enable to minimize the related environmental impact, but also considers the trace element composition of Estonian phosphorite in the view of possible recovery.

Responsibilities and tasks:

- Studying the specifics and proposing suitable and environmentally least harmful technologies for the production of phosphoric acid and mineral phosphate fertilizers by applying near zero-waste approach
- Estimating the formation, behaviour and possibilities for reuse of the possible hazardous by-products related to phosphorite processing (e.g. fluorine compounds and solid wastes) and filling the gaps of necessary know-how for diminishing their environmental impact
- Characterisation and recovery of potentially harmful (Cd, Pb, U, Th) and/or beneficiary trace elements (several REEs) in phosphorite.

Qualifications:

- Master's degree on Chemical engineering, chemical technology
- Chemical engineering and inorganic chemistry background



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