IMT Lille Douai
École Mines-Télécom
IMT-Université de Lille

Université de Lille 1 SCIENCES ET TECHNOLOGIES

Laboratoire Génie Civil et géo-Environnement Lille Nord de France

MASTER'S DEGREE RESEARCH PROJECT

STABILIZATION OF Sb-BEARING MINING WASTES IN CEMENT MEDIA

Context – aims & goals of the project

Mining activities result in a strong environmental impact; one of the most visible is the repository of leftovers and tailings. Such wastes may still contain metallic elements which are way beyond any commercially viable solution for exploitation but may still be harmful to the environment.

Cement media is known since a long time for yielding phases, such as ettringite, C-S-H or AFm (Gougar et al., 1996), which may be long-term stabilizers for pollutants by incorporating foreign ions in their crystal structures.

Specifically, the research project will investigate Sb-bearing mining wastes, for which few works only have been published (Kakali et al., 2005; Cornelis et al., 2012).

Among the goals of the project are the following points:

- Characterization of mining residues from former Sb mines,
- Synthesis of pure cementitious phases,
- Synthesis of cementitious phases incorporating Sb-bearing wastes in the raw meal,
- Mixing of wastes with commercial and laboratory cements (Portland-based or others) and understanding of their stabilization properties,
- Alkali-activation.

Prerequisites

The candidate will carry out a 6 months (January-June 2018) placement, in the framework of his/her 2nd year of master degree. Excellent skills in English are mandatory (statement of results for TOEIC, or any other internationally recognized English test, arguing for a high level, would be appreciated). French is an option but may be helpful for everyday's life.

The candidate will have a background in applied geosciences, materials chemistry or similar, with knowledge of the fundamentals in mineralogy as well as skills in microscopy.

Host institution

IMT Lille-Douai, located in the north of France, is an engineering school born on the 1st of january 2017 from the merging of the historical *École des Mines* (mining school) of Douai and the *École des Télécoms* of Lille. The civil & environmental department (12 professors or associates, 5

technicians, 15-25 PhD candidates and post-doc) carries out research in the broad field of waste management in building materials, building materials durability and recycling of building materials.

During the placement, the candidate will have access to the laboratory facilities such as XRD, SEM-EDS, sample preparation laboratory...

The income is ca. 500 euros/month.

Contact

Vincent THIÉRY – vincent.thiery@imt-lille-douai.fr

References

CORNELIS, G., ETSCHMANN, B., VAN GERVEN, T. & VANDECASTEELE, C. (2012). Mechanisms and modelling of antimonate leaching in hydrated cement paste suspensions. *Cement and Concrete Research* **42**, 1307–1316.

GOUGAR, M. L. D., SCHEETZ, B. E. & ROY, D. M. (1996). Ettringite and C-S-H portland cement phases for waste ion immobilization: A review. *Waste Management* **16**, 295–303.

KAKALI, G., TSIVILIS, S., KOLOVOS, K., VOGLIS, N., AIVALIOTIS, J., PERRAKI, T., PASSIALAKOU, E. & STAMATAKIS, M. (2005). Use of secondary mineralizing raw materials in cement production. A case study of a wolframite–stibnite ore. *Cement and Concrete Composites* **27**, 155–161.