Project title:

Synergetic conversion of inorganic (Ca-Si- and Fe-rich) waste streams and CO_2 to sustainable construction materials

Project details:

Finding applications for residue materials contributes to closing materials cycles, efficient reuse of resources and to the overall sustainability of production processes and products. This PhD project supports the development and implementation of synergetic, simultaneous conversion processes for inorganic residues and CO_2 in the Port of Antwerp, thereby targeting added value and additional industrial activities in the Antwerp province and Flemish region.

Carbon dioxide is widely recognized as greenhouse gas and associated to climate change. Carbon capture in inorganic residues represents a feasible way to mitigate emissions. The residues concerned in this research originate from various industrial activities, ao. petro-chemisty (CO_2), energy (ashes), metallurgy (slags) and waste processing (ashes and slags).

Preceding research at VITO has demonstrated that Ca-rich residues (slags) from the steel industry can be converted in valuable construction materials by means of reaction with CO_2. The next step is to extend this innovative and unique process to a wider range of residues.

The aim of the PhD project is to deepen the fundamental understanding of the reaction mechanism and the development of the microstructure in view of the mechanical performance of the construction material. In particular the specific role of silica and iron needs further clarification. The unique expertise available at the University of Antwerp and VITO will be instrumental in achieving the set objectives. The acquired knowledge aims to achieve technological improvements in the existing production process and to enable extension of the process to alternative residues.

Location:

The PhD candidate will have access to the facilities of both VITO (Mol, Belgium) and the University of Antwerp (Antwerp, Belgium). VITO (Flemish Institute of Technological Research) is a leading European independent research and technology organisation in the areas of cleantech and sustainable development, elaborating solutions for the large societal challenges of today. VITO has 750 highly-qualified employees and about 70 PhD students. The University of Antwerp is a major Belgian university (20000 students, 5000 employees) centrally located in the vibrant economic heart of Flanders.

Required education:

Eligible candidates should have an Engineering Degree in Materials, Chemistry, Civil engineering, Environmental Sciences; MSc in Chemistry, Geology/Mineralogy.

Promoters:

- VITO: Dr. Ruben Snellings, Dr. Mieke Quaghebeur
- University of Antwerp: Prof. Pegie Cool, Prof. Vera Meynen

Application and further information:

Please apply through the VITO website:
https://apps01.vito.be/VITODoctoraat/info/info.aspx?ID=440&Lang=EN

For more information please send your enquiry to Dr. Ruben Snellings (ruben.snellings@vito.be)