DOCTORAL CANDIDATE:	Lisa de Ruiter
DEGREE:	Philosophiae Doctor
FACULTY:	Faculty of Mathematics and Natural Sciences
DEPARTMENT:	Geosciences
AREA OF EXPERTISE:	Petrology, geochemistry, mineralogy
SUPERVISORS:	Håkon Austrheim, Dag K. Dysthe, Anette E. Gunnæs
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DISSERTATION TITLE:	*Rock cementation by magnesium silicate hydrate*

Sement er veldig vanlig i naturen siden de fleste sedimentære bergarter består av korn som er limt sammen av sement. I denne avhandlingen er en naturlig sementeringsprosess studert i håp om å hjelpe utviklingen av nye typer industriell sement. Sementindustrien har noen av de høyeste CO_2 utslippene og det er derfor en økende interesse for å finne nye typer sement. Kanskje vi kan lære fra naturen hvordan vi kan lage miljøvennlig sement?

The cement industry is one of the largest emitters of CO_2 and currently accounts for about 7% of the total anthropogenic CO_2 emissions. Finding alternative types of cement that could replace the widely used Portland cement, which is based on calcium carbonate, is therefore a state-of-the-art research topic. In her PhD work, De Ruiter searches for ideas for new types of cement by studying naturally cemented rocks. Cementation is a common process in nature as most sedimentary rocks consist of cemented grains. The idea of studying natural cement originated with the discovery of unique cemented rocks in the mountains of south-east Norway, close to Røros, which are cemented by magnesium silicate hydrate.

In her doctoral thesis, De Ruiter aims to characterize the natural magnesium silicate hydrate cement and to understand the processes and reactions that are involved in its formation to gain knowledge that could be of use in the cement industry. Chemical and structural analysis showed that the unique cemented rock can form because of the uncommon geological setting were magnesium-rich bedrock meets silicon-rich glacial deposits. The cement forms due to the interaction of fluids with these minerals and reactions at the mineral-fluid interface play therefore a key role. The rocks were first studied in the field and later in the laboratory on the micrometre and nanometre scale to gain insight into the formation process at all scales. This was achieved by studying samples with different techniques including scanning electron microscopy, transmission electron microscopy and x-ray diffractometry and by the conduction of experiments using atomic force microscopy. This way, the cement could be thoroughly analysed, and the formation process could not only be unravelled but also repeated in the laboratory.

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