

## **MICROSCOPIC SURFACE STUDY ON THE CORROSION OF CEMENT HYDRATES**

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Various studies on phases in the system  $\text{CaO-SiO}_2\text{-H}_2\text{O}$  have been published. Their ordering changes from semi-amorphous calcium silicate hydrates C-S-H, which are of fundamental importance in cement chemistry, to crystalline hydrothermal phases. Apart from the formation of C-S-H (binding process) there is great interest to understand their transformation under attack of acids and/or carbon dioxide (leaching, carbonation). It is accepted that during such a treatment the cement hydrates loose calcium, the Ca:Si ratio is reduced, and calcium carbonate is formed. Due to the lack of knowledge about the mechanism we are studying the reaction by direct imaging by means of atomic force microscopy assisted by scanning electron and light microscopy for phase and composition analysis. Using natural analogues of technical cement hydrates, which exhibit a higher degree of crystallinity, we found a locally restricted transformation of C-S-H, e.g. xonotlite with Ca:Si ratio of 2, to a phase with Ca:Si ratio of about 0.5 within well defined phase boundaries. Experimental and theoretical considerations indicate that the transformation is controlled by the crystallographic orientation of the starting material with respect to the sample surface. At present we are extending the variety of phases under examination as well as the leaching conditions. In a second step, after the planned application of Environmental SEM (ESEM), we focus on inhibitors of the carbonation process.