Nano-scale Studies of Processes on Crystal Surfaces in Aqueous Solutions

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At the crystal-water interface a large diversity of processes takes place which influence or even control environmental conditions. Among these processes are sorption, growth, dissolution, formation of surface complexes or metastable phases by leaching, repolymerization, or precipitation. For a detailed understanding of these processes, factors and properties such as the stability of metastable phases or structural frameworks need to be taken into account.

Hydrothermal atomic force microscopy has been used for nano-scale in-situ investigations of crystal surfaces in aqueous solutions [1-3]. The method can provide insights into the molecular mechanisms and kinetics of solid-liquid interface processes. The results stress that especially for processes taking place at silicate-water interfaces the consideration of the stability of metastable states and structural influences is very important. In contrast, mechanisms of processes at interfaces like the carbonate-water interface although largely unsolved rather seem to comprise sequences of less numerous steps.

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