Kinetic Monte Carlo studies on the effect of Ostwald ripening as an entrance to coupled kinetic systems

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Coupled dissolution and growth kinetics has gained growing interest in recent years, due to its importance for many natural and anthropogenic systems, like metamorphism, weathering, corrosion and nuclear waste management. There have been extensive experimental studies, showing many influencing processes determining the coupling behavior. However, coupled systems are sufficiently diverse and complex and thus a prediction of a long-term process rate is still not possible.

Therefore, the present study has the aim to gain a fundamental understanding of the coupling of crystallization and dissolution via solutions. Investigations are conducted using kinetic Monte Carlo simulations, which provide insights to the basic mechanisms contributing to the particle evolution at a molecular scale. The Ostwald ripening effect here serves as a simple entrance system, since it can merely be described with a single solid phase. Kinetic Monte Carlo models proved to give reliable results for real system evolution [1] [2], and together with experimental AFM and VSI studies might enable a general description for coupled kinetic systems as well as a first increment towards a long-term rate calculation.

[1] I. Kurganskaya, A. Luttge (2013a), *Geochimica et Cosmochimica Acta*, **120**, 545-560. [2] I. Kurganskaya, A. Luttge (2013b), *The Journal of Physical Chemistry C*, **117**, 24894-24906.