

## Electrokinetic tracking of CaCO<sub>3</sub> nucleation

MARZENA PRUS,<sup>1</sup> KAROLINA SZYMANEK,<sup>2</sup> JENNIFER MILLS,<sup>3</sup> LAURA NIELSEN LAMMERS,<sup>3</sup> WOJCIECH PIASECKI,<sup>2</sup> KAROLINA KEDRA-KRÓLIK,<sup>1</sup> PIOTR ZARZYCKI<sup>4,1</sup>

<sup>1</sup>Institute of Physical Chemistry, Polish Academy of Sciences, Warsaw, Poland; <sup>2</sup>Department of Chemistry and Biochemistry, AWF, Warsaw, Poland; <sup>3</sup>Department of Environmental Science, Policy and Management, University of California, Berkeley, CA; <sup>4</sup>Energy Geosciences Division, Lawrence Berkeley National Laboratory, Berkeley, CA

Calcium carbonate is one of the most common minerals with applications ranging from biomineralization, scale formation to carbon sequestration[1]. However, understanding its nucleation in the early stages remains a challenge due to the plethora of many possible and often concurrent transformation pathways.

In our work, we present time-resolved electrophoretic and potentiometric study of CaCO<sub>3</sub> nucleation from slightly supersaturated solutions, which shows signatures of multistage nucleation pathway[3]. The evolution of electrokinetic potential, particles morphology, solution pH and ionic composition are consistent with the spontaneous formation vaterite and its transformation to calcite via the dissolution-reprecipitation pathway. We show that electrokinetic potential measurements can be used to monitor nucleation and polymorphic transformations of carbonates *in situ*.

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