1. ABOUT THE DATASET

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Title: Dataset for Local Heating Transforms Amorphous Calcium Carbonate to Single Crystals with Defined Morphologies

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Publication Year:2025

Description: Dataset supporting a study of the pseudomorphic transformation of amorphous calcium carbonate (ACC). We demonstrate a straightforward method for controlling the crystallization of ACC thin films in which nucleation is first triggered using a heated probe, and growth is then sustained by incubating the film at a lower temperature. By independently controlling nucleation and growth we can readily generate sub-millimeter scale calcite single crystals when and where desired, create morphologies ranging from discs, to squares to serpentine strips, and generate arrays of crystals. We can also study the mechanism and energetics of crystallization of the ACC using in situ TEM and demonstrate continuity between the ACC and calcite at the growth front.

Cite as: Zhang, Nahi, He, Chen, Aslam, Kapur, Kim and Meldrum “Dataset for "Local Heating Transforms Amorphous Calcium Carbonate to Single Crystals with Defined Morphologies” University of Leeds. [Dataset] https://doi.org/10.5518/1173

Related publication: Zhang S., Nahi O., He X., Chen L., Aslam Z., Kapur N., Kim Y-Y. and Meldrum F.C. “Local Heating Transforms Amorphous Calcium Carbonate to Single Crystals with Defined Morphologies” Adv. Func. Mater. (2022) 32(41), 2207019.

2. TERMS OF USE

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3. PROJECT AND FUNDING INFORMATION

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Title: DYNAMIN

Dates: Sept 2018 to Aug 2025

Funding organisation: ERC

Grant no.: Grant Agreement No. 788968

Title: Crystallisation in the Real World: Delivering Control through Theory and Experiment

Dates: Mar 2018 - Feb 2024

Funding organisation: EPSRC

Grant no.: EP/R018820/1

4. CONTENTS

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***Folder***: Growth Rate

Images showing growth at different temperatures (jpg files)

Excel files showing analysis of growth rates

***Folder***: HR-TEM data

TIFF and JPG files showing high resolution TEM data of thin films.

File names show [Ca] / [Mg] / [PAA]

***Folder***: Large Patterns Complex Shapes

Contains 2 folders showing templated ACC produced at [Ca]=10/ [Mg]=4/ [PAA]=4, and after heating to 140C

***Folder***: Movies

Movies in avi, mov and wmv format

5 movies provided as SI to the published paper

3 additional movies showing growth of a single crystal, movement of a growth front and rotation of disc arrays

***File***: Supplementary Information

SI as published with linked article

5. METHODS

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A full description of the methods and how data were recorded is provided in the associated full publication.