Data in Brief ∎ (∎∎∎∎) ∎∎∎–∎∎∎

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Data Article

Archival biogenic micro- and nanostructure data analysis: Signatures of diagenetic systems

Laura A. Casella [a,*], María del Mar Simonet Roda [a], Lucia Angiolini [b], Andreas Ziegler [c], Wolfgang W. Schmahl [a], Uwe Brand [d], Erika Griesshaber [a]

[a] Department of Earth and Environmental Sciences, Ludwig-Maximilians-Universität München, Theresienstr. 41, 80333 Munich, Germany
[b] Dipartimento di Scienze della Terra "A. Desio", Università degli Studi di Milano, Via Mangiagalli 34, 20133 Milan, Italy
[c] Central Facility for Electron Microscopy, University of Ulm, Albert-Einstein-Allee 11, 89069 Ulm, Germany
[d] Department of Earth Sciences, Brock University, 1812 Sir Isaac Brock Way, St. Catharines, Ontario, Canada L2S 3S1

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Nanocomposite mesocrystal biocarbonate [NMB]
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Brachiopods
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Low-Mg calcite

ABSTRACT

The present data in brief article provides additional data and information to our research article "Micro- and nanostructures reflect the degree of diagenetic alteration in modern and fossil brachiopod shell calcite: a multi-analytical screening approach (CL, FE-SEM, AFM, EBSD)" [1] (Casella et al., in press). We present fibre morphology, nano- and microstructure, as well as calcite crystal orientations and textures found in pristine, in experimentally, hydro-, and thermally, altered and in diagenetically overprinted brachiopod shells. By using the combination of the screening tools AFM, FE-SEM and EBSD, it can be observed that microstructural and textural characteristics change significantly with an increasing degree of laboratory-based and naturally occurring diagenetic alteration. Amalgamation of neighbouring fibres was observed on

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* Corresponding author.
E-mail address: Laura.Casella@lrz.uni-muenchen.de (L.A. Casella).

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the micrometre scale level, whereas progressive decomposition of biopolymers in the shells and fusion of nanoparticulate calcite crystals was detected on the nanometre scale. The presented data in this article and the study described in [1] allows for qualitative information on the degree of diagenetic alteration of fossil archives used for palaeoclimate reconstruction.

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Specifications Table

Subject area	*Crystallography*
More specific subject area	*Micro- and nanostructure of modern and fossil biogenic carbonate archives*
Type of data	*Figures, text file*
How data was acquired	*Microtome: Leica Ultracut equipped with glass knives and DiATOME diamond knife* *Critical Point Drying: BAL-TEC CPD 030* *FE-SEM: Hitachi S5200 field emission SEM* *EBSD: Hitachi SU5000 field emission SEM equipped with a Nordlys II EBSD detector and AZTec acquisition software* *AFM: JPK Instruments NanoWizard II equipped with a n^+-silicon cantilever, measurements were conducted in contact mode*
Data format	*Analysed*
Experimental factors	*Thermal and hydrothermal alteration experiments*
Experimental features	*Thermal alteration experiments on modern brachiopod specimens were performed under dry conditions at 100 °C (for 72 hours, and three months), and at 400 °C (for 48 hours).* *Hydrothermal alteration experiments on modern brachiopod specimens were conducted in either simulated meteoric or burial fluids at 175 °C for 28 days.* *Pristine, thermally and hydrothermally altered, and fossil brachiopod shell fragments were embedded in epoxy resin and successively ground and polished for further investigations [see 1, 2].*
Data source location	*Friday Harbor Laboratories, University of Washington, U.S.A. (Terebratalia transversa),* *Signy and Rothera Islands, Antarctica (Liothyrella uva),* *Upper Ordovician Dillsboro Formation, Indiana, U.S.A (Platystrophia laticostata),* *Lower Jurassic Ait Athmane Formation of the Central High Atlas Basin, Morocco (Quadratirhynchia attenuata) ,* *Luc-Sur-Mer, Normandy, France (Digonella digona) and, Bakony Mountains, Hungary (Lobothyris punctata).*
Data accessibility	*Data is with this article*

Value of the data

- The data provides fundamental, quantitative and qualitative information on the assessment of the degree of (diagenetic) alteration of brachiopod shells.
- Hydrothermal alteration experiments mimicking diagenetic alteration may be applied to other biogenic hard tissues and inorganic mineral assemblages (e.g., rocks) in order to objectively compare the degree of diagenetic overprint.

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