

# PUBLIKATIONSLISTE PROF. DR. FABRITIUS

Stand März 2019

## Bücher und Buchbeiträge:

Friák, M., Fabritius, H.-O., Nikolov, S., Petrov, M., Lymperakis, L., Sachs, C., Elstnerová, P., Neugebauer, J., Raabe, D.: Multi-scale Modelling of a Biological Material: The Arthropod Exoskeleton. In: Fratzl, P., Dunlop, J.W.C. and Weinkamer, R. (Eds.): *Materials Design Inspired by Nature: Function Through Inner Architecture*. RSC Publishing. 2013, 197-218.

Nikolov, S., Fabritius, H., Friák, M., Raabe, D.: Hierarchical modeling of biological nanocomposites. In: Kavardzhikov, V., Parashkevova, L., Baltov A. (Eds.): *Mechanics of Nanomaterials and Nanotechnology (Series in Applied Mathematics and Mechanics, vol. 3)*, Institute of Mechanics – BAS. Sofia, 2012, 199-224.

Fabritius, H., Sachs, C., Raabe, D., Nikolov, S., Friák, M., Neugebauer, J.: Chitin in the exoskeletons of Arthropoda: From ancient design to novel materials science; in Gupta, S.N. (Ed.): *Chitin: formation and diagenesis*. Germany: Springer. 2011.

## Dissertation:

Fabritius, H.-O.: Nano-architecture and mineralization of the amorphous CaCO<sub>3</sub> deposits during the molt cycle of the terrestrial isopod *Porcellio scaber* (Crustacea). Dr. rer.nat. thesis, Universität Ulm, <http://d-nb.info/1000942848>, 2008.

## Manuskripte und Vorabdrucke:

Politi, Y., Bar-On, B. and Fabritius, H.-O.: Mechanics of Arthropod Cuticle – Versatility by Structural and Compositional Variation, in Estrin, Y., R., Bréchet, Y., Dunlop, J., Fratzl, P. (Eds.): *Architected Materials in Nature and Engineering*. Springer Series in Materials Science 282, <https://doi.org/10.1007/978-3-030-11942-3>, Springer International Publishing, 2019.

## Artikel in Fachjournalen:

Roters, F., Diehl, M., Shanthraj, P., Eisenlohr, P., Reuber, C., Wong, S. L., Maiti, T., Ebrahimi, A., Hochrainer, T., Fabritius, H.-O., Nikolov, S., Friák, M., Fujita, N., Grilli, N., Janssens, K. G. F., Jia, N., Kok, P. J. J., Ma, D., Meier, F., Werner, E., Stricker, M., Weygand, D., Raabe, D.: DAMASK - The Düsseldorf Advanced Material Simulation Kit for Modeling Multi-Physics Crystal Plasticity, Thermal, and Damage Phenomena from the Single Crystal up to the Component Scale. *Comp. Mater. Sci.*, 158: 420-478, 2019.

Fabritius-Vilpoux, K., Enax, J., Herbig, M., Raabe, D., Fabritius, H.-O.: Quantitative Affinity Parameters of Synthetic Hydroxyapatite and Enamel Surfaces in vitro. *Bioinspir. Biomim. Nan.*, <https://doi.org/10.1680/jbibn.18.00035>, 2018.

Seidl, B. H. M., Griesshaber, E., Fabritius, H.-O., Reisecker, C., Hild, S., Taiti, S., Schmahl, W. W., Ziegler, A.: Tailored disorder in calcite organization in tergite cuticle of the supralittoral isopod *Tylos europaeus* Arcangeli, 1938. *J. Struct. Biol.*, 204: 464-480, 2018.

Wu, X., Rodríguez-Gallegos, F. L., Heep, M.-C., Schwind, B., Li, G., Fabritius, H.-O., von Freymann, G., Förstner, J.: Polarization Conversion Effect in Biological and Synthetic Photonic Diamond Structures. *Adv. Optical Mat.*, 6(24): 1800635, 2018.

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Fabritius, H.-O., Ziegler, A., Friák, M., Nikolov, S., Huber, J., Seidl, B., Ruangchai, S., Alagboso, F., Karsten, S., Lu, J., Janus, A. M., Petrov, M., Zhu, L.-F., Hemzalová, P., Hild, S., Raabe, D., Neugebauer, J.: Functional adaptation of crustacean exoskeletal elements through structural and compositional diversity: a combined experimental and theoretical study. *Bioinspir. Biomim.*, 11: 055006, 2016.

Wu, X., Ma, D., Eisenlohr, P., Raabe, D., Fabritius, H.-O.: From insect scales to sensor design: modelling the mechanochromic properties of bicontinuous cubic structures. *Bioinspir. Biomim.* 11: 045001, 2016.

Lübke, A., Enax, J., Wey, K., Fabritius, H.-O., Raabe, D., Epple, M.: Composites of fluoroapatite and methylmethacrylate-based polymers (PMMA) for biomimetic tooth replacement. *Bioinspir. Biomim.* 11: 035001, 2016.

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Friák, M., Zhu, L.-F., Lymperakis, L., Titrian, H., Aydin, U., Janus, A.M., Fabritius, H.-O., Ziegler, A., Nikolov, S., Hemzalová, P., Raabe, D., Neugebauer, J.: Quantum-mechanical study of single-crystalline and polycrystalline elastic properties of Mg-substituted calcite crystals. *Key Eng. Mat.* 592-593:335-341, 2014.

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### **Konferenzbeiträge und populärwissenschaftliche Publikationen:**

Fabritius, H.-O., Meyer, F., Enax, J.: "Biomimetik: Die Natur als Vorbild", *Spektrum der Wissenschaft* Ausgabe 12.18, S. 46-53, 2018.

Meyer, F., Fabritius, H.-O., Enax, J.: Spezielle Zahnpflege bei Dentinhypersensibilität. *ZMK Zahnmedizin* 33: 12, 2017.

Fabritius, H.-O.: "Tierisch gute Werkstoffe: Was wir von Krebsen lernen können.", Beitrag in der Sendung „Campus Talks“, ARD alpha, aufgezeichnet am 15.02.2017, Ausstrahlung im Juli 2017, <https://www.br.de/fernsehen/ard-alpha/sendungen/campus/talks/campus-talks-fabritius-helge100.html>.

Dell, A., Enax, J., Fabritius, H., Prymak, O., Raabe D., Epple, M.: Struktur und Zusammensetzung von fossilen Haifischzähnen. *BioNanoMaterials* 15(S1):72, 2014.

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Fabritius, H.-O.: "The lobster as a packaging artist", *Sulzer Technical Review Magazine*, Edition 2.2013, S. 9, 2013.

Enax, J., Prymak, O., Epple, M., Fabritius, H., Raabe, D.: Strukturhierarchie, chemische Zusammensetzung und mechanische Eigenschaften von Haifischzähnen. *BioNanoMaterials* 13:57, 2012.

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Fabritius, H.-O.: "Die Rezeptur der Hummerschale", *Max Planck Forschung Magazin*, Edition 4.2011, S. 72-79, 2011.

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Elstnerová, P., Friák, M., Fabritius, H. O., Lymperakis, L., Hickel, T., Petrov, M., Nikolov, S., Raabe, D., Ziegler, A., Hild, S., Neugebauer, J.: Enhancing mechanical properties of calcite by Mg substitutions: a quantum-mechanical study (in Czech), In *Sborník doktorské konference: Víceúrovňový design pokrokových materiálů*. Brno: Ústav fyziky materiálů AVČR, 13-20, 2010.

Raue, L., Klein, H., Raabe, D., Fabritius, H.: Crystallographic Textures from the Exoskeleton of the Lobster *Homarus Americanus* and Calculation of the Mechanical Properties of the Calcite Phase; in A.D. Rollett (ed.): *Proc. 15th Intern. Conf. on Textures of Materials (ICOTOM 15)*, Part 2. *Ceramic Transactions Vol. 201*, John Wiley & Sons Inc., Hoboken, New Jersey, 637-655, 2009.

Nikolov, S., Sachs, C., Fabritius, H., Raabe, D., Petrov, M., Friák, M., Neugebauer, J., Lymperakis, L., Ma, D.: Hierarchical modeling of the mechanical properties of lobster cuticle from nano- up to

macroscale: The influence of the mineral content and the microstructure. Proceedings of the 4th International Conference Multiscale Materials Modeling, 667-670, 2008.

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### **Patente und Patentanmeldungen:**

Fabritius, H.-O. Enax, J., Klenk, A.: Hydroxylapatit. Patentanmeldung DE 10 2018 102 365.0, 2018

## Vollständiges Verzeichnis der eingeladenen Vorträge

### Konferenzen und Workshops:

Fabritius, H.-O.: Exploring biomimetic oral care concepts using advanced electron microscopy. The Goettingen Spirit Summer School "Biological Research in Dentistry", Göttingen, Germany, Sep 18-19, 2018.

Fabritius, H.-O.: Small-scale structure-property relations in biological hard tissues by nanoindentation. Indentation 2018, Liège, Belgium, Sep 11-14, 2018.

Fabritius, H.-O., Fabritius-Vilpoux, K., Enax, J.: Quantitative Interaktion von HAP-Partikeln mit standardisierten Schmelzoberflächen in vitro und ultrastrukturelle Untersuchungen von Milchzähnen. Biorepair-Symposium, Bielefeld, Germany, Dec 1-2, 2017.

Fabritius, H.-O.: Broadband reflecting fibers with tailored structures inspired by desert ants. SPP 1839 – Retreat, Kostenz, Germany, Sept 18-20, 2017.

Fabritius, H.-O., Fabritius-Vilpoux, K., Enax, J.: In-vitro-Untersuchungen zur Wechselwirkung von synthetischen Hydroxylapatit-Partikeln mit der Zahnschmelzoberfläche. Biorepair-Symposium, Bielefeld, Germany, May 20, 2017.

Fabritius, H.-O.: How living organisms manipulate light: Photonic structures in nature. Spring School of the SPP 1839 „Tailored Disorder“, Karlsruhe, Germany, May 15-17, 2017.

Fabritius, H.-O., Wu, X.: Mechanochromic photonic crystals based on cuticular scales of the weevil *Entimus imperialis*. IOP Conference 'Optical Biomimetics', Imperial College London, London, UK, Feb 22, 2017.

Fabritius, H.-O., Enax, J., Wu, X., Epple, M., Raabe, D.: Structure-property relations in biological composite materials: An inspiration source for synthetic materials. Flash talk and poster at the 8th Indo-German Frontiers of Engineering Symposium 2016 organized by the Alexander von Humboldt Foundation, Potsdam, Germany, May 19-22, 2016.

Fabritius, H.-O., Schwind, B. and Wu, X.: Broadband reflecting fibers with tailored structures inspired by desert ants. SPP 1839 Kick-off and Networking Meeting, Wilhelm-Conrad-Roentgen Campus (Bessy II), Berlin, Germany, Feb 26, 2016.

Fabritius, H.-O.: Photonische Strukturen in der Natur: Wie Lebewesen Licht manipulieren. Meilensteintreffen BMBF Nachwuchsgruppe morPHOX, Universität Paderborn, Paderborn, Germany, Dec 16, 2015.

Fabritius, H.-O., Enax, J., Huber, J., Ziegler, A., Epple, M., Raabe, D.: Small-scale structure-property relations in structurally graded biological materials. Nanobrücken 2015, A Nanomechanical Testing Workshop & Hysitron User Meeting, Potsdam, Germany, Apr 21-23, 2015.

Fabritius, H.-O.: Alternative Präparationsmethoden für nichtmetallische Werkstoffe. Fachtagung Mikroskopie und Präparation (mikpräp) der Gesellschaft für Materialografie Rhein Ruhr e.V. (gmr2), Solingen, Germany, Mar 19, 2015.

Fabritius, H.-O., Enax, J., Wu, X., Epple, M., Raabe, D.: Structure-property relations in biological composite materials: An inspiration source for synthetic materials. 79th Annual Meeting of the DPG and DPG Spring Meeting 2015, Berlin, Germany, Mar 15-20, 2015.

Fabritius, H.-O., Janus, A., Wu, X., Nikolov, S., Eisenlohr, P., Friák, M., Neugebauer, J., Raabe, D.: Structure-property Relations in the Arthropod Exoskeleton, a Multifunctional Biological Composite. Materials Science & Technology (MS&T) 2014, Pittsburgh, PA, USA, Oct 12-16, 2014.

Fabritius, H.-O.: Biological Photonic Structures. Keynote at the Kick-Off meeting of the DFG SPP1839, Wilhelm-Conrad-Roentgen Campus (Bessy II), Berlin, Germany, Sep 25, 2014.

Enax, J., Fabritius, H., Roters, F., Raabe, D., Epple, M.: Synthetic dental composite materials inspired by the hierarchical organization of shark tooth enameloid. 3rd Winter school within the DFG priority programme 1420 "Biomimetic Materials Research: Functionality by Hierarchical Structuring of Materials", Potsdam, Germany, Mar 17-18, 2014.

Fabritius, H.-O.: Structure-property relations in biological materials – Opportunities and challenges. Summer School of the SPP1420 at the University of Ulm, Ulm, Germany, Jul 25-26, 2013.

Janus, A. M., Fabritius, H., Lu, J., Raabe, D., Friák, M., Elstnerová, P., Neugebauer, J., Nikolov, S.: Structural interfaces enable function-related variations of properties in the exoskeleton of Crustacea. Ringberg Symposium 2012: Generation of Inorganic Functional Materials - Implementation of Biomineralization Principles, Schloss Ringberg, Rottach-Egern, Germany, Sep 30 – Okt 3, 2012.

Ziegler, A., Ruangchaj, S., Seidl, B., Huber, J., Hild, S., Reisecker, C., Raabe, D., Fabritius, H., Janus, A., Karsten, S., Lu, J., Neugebauer, J., Friák, M., Elstnerová, P., Nikolov, S.: Crustacean skeletal elements: Variations in the constructional morphology at different hierarchical levels. 2nd Winter school within the DFG priority programme 1420 "Biomimetic Materials Research: Functionality by Hierarchical Structuring of Materials", Potsdam, Germany, Mar 19-20, 2012.

Fabritius, H., Nikolov, S., Hild, S., Ziegler, A., Friák, M., Neugebauer, J., Raabe, D.: Design principles of crustacean cuticle: from molecules to skeletal elements. Workshop „From Nanoparticle Assembly to Functional Polymer Components”, Department of Geo- and Environmental Sciences, LMU Munich, München, Germany, Jul 8, 2011.

Fabritius, H., Nikolov, S., Hild, S., Ziegler, A., Friák, M., Neugebauer, J., Raabe, D.: Design principles of Arthropod cuticle evaluated experimentally and by ab initio-based multiscale simulations. Ringberg Symposium 2010: Molecular Bionics - From Biomineralization to Functional Materials, Schloss Ringberg, Rottach-Egern, Germany, Okt 3-6, 2010.

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Fabritius, H., Sachs, C., Nikolov, S., Romano, P., Hild, S., Raabe, D.: Influence of structural principles at different length scales on the mechanics and functional efficiency of biological materials. Ringberg Symposium 2008: Biological Approaches in Materials Sciences, Schloß Ringberg, Rottach-Egern, Germany, Okt 1-4, 2008.

### **Kolloquien und Abteilungsseminare:**

Fabritius, H.: Structure-property relations in biological composite materials – The arthropod exoskeleton. Chemical Engineering and Materials Science Seminar, Michigan State University, East Lansing, MI, USA, Oct 9, 2014.

Fabritius, H.-O.: Structure-property relations in biological composite materials. Seminar Department of Earth- and Environmental Sciences, LMU Munich, München, Germany, Feb 21, 2014.

Fabritius, H.: Biologische Verbundwerkstoffe: Korrelation von Struktur, Zusammensetzung und physikalischen Eigenschaften am Beispiel der Arthropodenkutikula. Anorganisch-Chemisches Kolloquium, Fakultät für Chemie, Universität Duisburg-Essen, Duisburg, Germany, Apr 17, 2012.

Fabritius, H., Nikolov, S., Hild, S., Ziegler, A., Friák, M., Neugebauer, J., Raabe, D.: Mechanical Design Principles of Crustacean Cuticle evaluated experimentally and by Ab initio-based Multiscale Simulations. Institute Colloquium, Institut de Mécanique des Fluides et des Solides, CNRS Strasbourg, Strasbourg, France, Mar 17, 2011.

Fabritius, H., Sachs, C., Nikolov, S., Romano, P., Hild, S., Raabe, D.: Wie beeinflussen Struktur und chemische Zusammensetzung auf unterschiedlichen Längenskalen die mechanischen Eigenschaften von biologischen Materialien? Institute Colloquium, Department of Polymer Science, Johannes Kepler University Linz (JKU), Austria, Nov 20, 2008.

Fabritius, H., Ziegler, A.: Nano-architecture and mineralization of the amorphous CaCO<sub>3</sub> deposits during the molt cycle of the terrestrial isopod Porcellio scaber. Institute Colloquium, Max-Planck-Institut für Eisenforschung GmbH, Düsseldorf, Germany, Nov 14, 2004.

## Vollständiges Verzeichnis sonstiger Präsentationen

### Konferenzvorträge:

Fabritius-Vilpoux, K., Enax, J., Fabritius, H.-O.: Quantitative analysis of affinity parameters between synthetic hydroxyapatite and enamel. 96th General Session & Exhibition of the International Association for Dental Research (2018 IADR/PER), London, United Kingdom, Jul 25-28, 2018.

Fabritius, H.-O., Wu, X., Schwind, B.: Broadband reflection by desert ants. Living Light Conference 2016, San Diego, CA, USA, May 4-6, 2016.

Fabritius, H., Nikolov, S., Janus, A.M., Eisenlohr, P., Friák, M., Neugebauer, J., Raabe, D.: Comparison of the mechanical behavior of exoskeletal parts from different Crustacea – Experiments and Modeling. MRS Fall Meeting 2013, Boston, MA, USA, Dec 1-6, 2013.

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