

## Hermann Ehrlich

Prof. Dr. rer. nat. habil



Hermann served as a postdoctoral researcher at Max-Bergmann Centre of Biomaterials and Institute of Materials Science in Dresden, and currently holds a W3 Heisenberg full professor position at the Institute of Experimental Physics at the TU Bergakademie in Freiberg. His research is focused on marine biomaterials, biominerals, biocomposites and biomimetics. Using biochemical, cellular, molecular, and analytical approaches, he and his co-workers, for the first time, discovered and characterized chitin and novel hydroxylated collagen in the skeletal formations of marine sponges. During last five years, he has published over 50 peer reviewed articles, five book chapters, two monograph and additionally holding four patents. Being the corresponding author, Hermann Ehrlich published his papers in such high impact journals as *Nature Chemistry*, *Nature Scientific Reports*, *Chemical Reviews*, *Advanced Functional Materials*, *Chemistry of Materials* etc. In recent times, together with members of his team, he published various scientific discoveries in the field of biological materials, for example:

- Discovery of chitin in marine horn and glass sponges (2007, 2008), as well as in fresh water sponges (2013)
- Discovery of chitin in cell walls of diatoms (2009)
- Discovery of new collagen type in spiculae of glass sponges (2010)
- Discovery of chitin silicate aragonite as well as silicate calcite biocomposite in the skeletons of marine sponges (2010, 2011)
- Discovery of the world's oldest (505 MYR) thus far known chitin (2013)
- Discovery of a living coral reef in Iraq (2014).

He represented numerous invited and keynote lectures at Columbia University, at Yale University, at Massachusetts Institute of Technology as well. H. Ehrlich is the editorial board member of the international journal "*Frontiers in Materials Science*", "*Bioinspired Materials*", "*Journal of Chitin and Chitosan Science*" and editor of the special issue "*Marine Biomaterials*" of the journal "*Marine Drugs*". He was elected to be the Chief-chairman of the next *International Symposium on Biomineralization* "BIOMIN'12" that took place in August 2013 in Freiberg, Germany. Recently, H. Ehrlich has been nominated for Gottfried Wilhelm Leibniz-Prize 2015.

## SCIENTIFIC AREA

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- Biomineralization
- Biomaterials
- Biocomposites
- Extreme Biomimetics

## TEACHING (TU DRESDEN; TU BAF FREIBERG)

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2008-2009	Electrochemistry
2010-2013	Bioengineering
2014	Biominerology (International Master Course)

## SCIENTIFIC COLLABORATION

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- **Prof. Christine Ortiz, Prof. Markus Buehler**  
Dept. of Materials Science and Engineering,  
Massachusetts Institute of Technology,  
Cambridge MA, USA
- **Prof. Catherine H. Skinner**  
Dept. of Geology, Yale University, USA
- **Prof. Andrew Parker**  
Dept. of Zoology, University of Oxford, UK

## INVITED REFEREE

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- **National Foundations:**
  - National Science Foundation, (NSF), USA – in Biomineralization (2010)
  - National Agency of Science (NAS), Irland – in Marine Biomaterials (2011)
  - German Research Foundation (DFG), Germany – in Special Zoology (2011)
  - National Science Centre (NCN), Poland – in Materials Science (2012)

- **Journals:**

<b>Journal</b>	<b>Impact Factor</b>
Chemical Reviews	45,661
Nature	42,351
Science	31,480
JACS	11,444
Nature Communications	10,742
Chemistry of Materials	8,535
J. of Biomedical Nanotechnology	7,578
Precambrian Research	6,023
Journal of Macromolecules	5,927
ACS Applied Materials & Interfaces	5,900
Cellular and Molecular Life Sciences	5,856
Biomacromolecules	5,788
Journal of Membrane Science	4,908

Molecular Pharmaceutics	4,787
Crystal Growth & Design	4,558
WIREs Nanomedicine & Nanobiotechnology	4,239
Acta Biomaterialia	3,940
RCS Advances	3,708
European Journal of Cell Biology	3,699
Journal of Colloid and Interface Science	3,552
PLOS one	3,534
Marine Biotechnology	3,152
International J. Biol. Macromolecules	3,096
ChemBioChem	3,060
Journal of Experimental Biology	3,000
Biomedical Materials	2,922
Bioinspiration & Biomimetics	2,534
European Journal of Biophysics	2,474
International Journal of Molecular Sciences	2,339
Ceramic International	2,086
Materials	1,879
Applied Physics A	1,694
Zoology (Elsevier)	1,596
Food Biophysics	1,551
Journal of Applied Polymer Science	1,395
Journal of Nanoscience and Nanotechnology	1,339
Central European Journal of Chemistry	1,329
Zeitschrift für Kristallographie	1,255
Biotechnology and Bioprocess Engineering	1,220
IEEE TRANSACTIONS ON MAGNETICS	1,213
Crystal Research and Technology	1,164
Polish Journal of Chemical Technology	0,474

## EDITORIAL ACTIVITY

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- Editorial board member: Frontiers of Materials Science, Journal of Chitin and Chitosan Science, Bioinspired Materials, Marine Drugs
- Editor: Marine Drugs (Special issue “Marine Biomaterials”) (2011, 2014)

## PUBLICATIONS

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***h*-index = 19; Scopus: 977 total citations by 568 documents**

**cumulative impact factor: 307**

### Books & Book Chapters

- 1) Ehrlich H., Worch H. (2007) Collagen, a huge matrix in glass-sponge flexible spicules of the meter-long *Hyalonema sieboldi*. In: **Handbook of Biomineralization**. Vol.1. *The Biology of Biominerals Structure Formation*. Ed. by

- Bäuerlein Wiley VCH, Weinheim, pp.23-41
- 2) **Ehrlich H.**, Ereskovsky A., Vyalikh D.V., Molodtsov S.L., Mertig M., Göbel C., Simon P., Hanke T., Heinemann S., Krylova D. D., Pompe W., Worch H. (2007) **In: *Biom mineralization: From Paleontology to Materials Science***, Arias, J.L., Fernandez, M.S. (Eds.) Editorial Universitaria, Santiago de Chile, pp. 439-448.
  - 3) **Ehrlich H.**, Worch H. (2007) Sponges as natural composites: from biomimetic potential to development of new biomaterials. **In: *Porifera Research: Biodiversity, Innovation & Sustainability***, Ed. by E. Hajdu. Série Livros 28, Museu Nacional, Rio de Janeiro. pp. 217-223.
  - 4) Brunner E., **Ehrlich H.**, Kammer M. (2010) Biomimetic Synthesis of Nanostructures Inspired by Biomineralization. **In: *Handbook of Nanophysics: Nanomedicine and Nanorobotics***. Ed. by Klaus D. Sattler UNIVERSITY OF HAWAII-MANOA, HONOLULU, HAWAII, USA v.7. pp.6-14
  - 5) **Ehrlich H.** (2010) Biological Materials of Marine Origin. Invertebrates. (Monograph) (ISBN 978-90-481-9129-1) Springer Verlag, p.594
  - 6) **Ehrlich H.** (2011) Silica biomineralization in Sponges. **In: *Encyclopedia of Geobiology***. J. Reitner and V. Thiel (Eds.) Springer Verlag (pp.796-808)
  - 7) **Ehrlich H.** (2013) Biomimetic potential of chitin-based composite biomaterials of poriferan origin. **In: *Biomimetic biomaterials: structure and applications*** (Ed. A.J. Ruys). Woodhead Publishing, pp. 47-67
  - 8) Skinner H.C.W., **Ehrlich H.** (2013) Biomineralization. **In: *Treatise on Geochemistry. Vol. 10: Biogeochemistry***, 2nd Edition (Eds. K.K. Turekian, H.D. Holland). Elsevier Science, pp. 105-162 (2013).
  - 9) **Ehrlich H.** (2015) Biological Materials of Marine Origin. Vertebrates. (Monograph) Springer Verlag, p.594
  - 10) **Ehrlich H.**, A. Witkowski (2015) Biomineralization in Diatoms: The Organic Templates. **In: *Evolution of Lightweight Structures*** (Ed. Christian Hamm). Series: Biologically-Inspired Systems, Vol. 6, Springer Science + Business Media B. V., p. 217. In press.
  - 11) **Ehrlich H** (editor) (2015) Extreme Biomimetics. Springer NY, p. 450 (*in preparation*)

## Peer-reviewed Papers

- 1) **Ehrlich H.**, Douglas T., Scharnweber D., Hanke T., Born R., Bierbaum S., Worch H. (2005) Hydroxyapatite Crystal Growth on Modified Collagen I-Templates in a Model Dual Membrane Diffusion System. *Journal of Inorganic and General Chemistry* 631, 10: 1825-1830 (**IF 1.251**)
- 2) **Ehrlich H.**, Krajewska B., Hanke T., Born R., Heinemann S., Knieb C., Worch H. (2006) Chitosan membrane as a template for hydroxyapatite crystal growth in a model dual membrane diffusion system. *Journal of Membrane Science* 273, 124-128 (**IF 4.908**)
- 3) **Ehrlich H.**, Etnoyer P., Litvinov S., Olennikova M., Domaschke H., Hanke T., Born R., Worch H. (2006) Biomaterial structure in deep-sea bamboo coral (Anthozoa: Gorgonaceae: Isididae): perspectives for the development of bone implants and templates for tissue engineering. *Materialwissenschaft und Werkstofftechnik*, 37(6): 552-557 (**IF 0.505**)
- 4) **Ehrlich H.**, Ereskovsky A., Drozdov A., Krylova D., Hanke T., Meissner H., Heinemann S., Worch H. (2006) A modern approach to demineralisation of spicules

in the glass sponges (Hexactinellida: Porifera) for the purpose of extraction and examination of the protein matrix. *Russian Journal of Marine Biology* 32(3): 186-193 (IF 0.496)

- 5) **Ehrlich H.**, Maldonado M., Spindler K-D, Eckert C, Hanke T., Born R, Goebel C., Simon P., Heinemann S., Worch H. (2007) First evidence of chitin as a component of the skeletal fibers of marine sponges. Part I. Verongidae (Demospongia: Porifera) *Journal Experimental Zoology (Mol Dev Evol)*, 308B: 347-356 (IF 2.123)
- 6) **Ehrlich H.**, Krautter M., Hanke T., Simon P., Knieb C., Heinemann S., Worch H. (2007) First evidence of the presence of chitin in skeletons of marine sponges. Part II. Glass sponges (Hexactinellida: Porifera). *Journal of Experimental Zoology (Mol Dev Evol)*, 308B: 473-483 (IF 2.123)
- 7) Kubisz L., **Ehrlich H.** (2007) Temperature dependence of electric conductivity of bamboo coral skeleton and glass sponge spicules, the marine origin biomaterials. *Journal of Non-Crystalline Solids*, 353: 4497-4500 (IF 1.716)
- 8) Heinemann S, **Ehrlich H.**, Douglas T., Heinemann C., Worch H., Schatton W., Hanke T. (2007) Ultrastructural studies on the collagen of the marine sponge *Chondrosia reniformis* Nardo. *Biomacromolecules*, 8: 3452-3457 (IF 5.788)
- 9) Heinemann S., **Ehrlich H.**, Knieb C., Hanke T. (2007) Biomimetically inspired hybrid materials based on silicified collagen. *International Journal of Materials Research*, 98: 603-608 (IF 0.675)
- 10) Heinemann S., Knieb C., **Ehrlich H.**, Meyer M., Baltzer H., Worch H., Hanke T. (2007) A novel biomimetic hybrid material made of silicified collagen: perspectives for bone replacement. *Advanced Engineering Materials*, 9(12): 1061-1068 (IF 1.508)
- 11) Simon P., Lichte H., Formanek P., Lehmann M, Huhle R, Carrillo-Cabrera W., Harscher A., **Ehrlich H.** (2008) Electron Holography of Biological Samples. *Micron*, 39: 229-256 (IF 2.062)
- 12) **Ehrlich H.**, Koutsoukos P., Demadis K., Pokrovsky O. (2008) Principles of Demineralization: Modern Strategies for the Isolation of Organic Frameworks. Part I. Common Definitions and History. *Micron*, 39: 1062-1091 (IF 2.062)
- 13) **Ehrlich H.**, Heinemann S., Heinemann C., Simon P., Bazhenov V.V., Shapkin N.P., Tabachnick K.D., Worch H., Hanke T. (2008) Nanostructural organisation of naturally occurring composites: Part I. Silica-Collagen-Based Biocomposites. *Journal of Nanomaterials*, doi: 10.1155/2008/670235 (published online, Article ID 623838, 8 pages) (IF 1.611)
- 14) **H. Ehrlich**, D. Janussen, P. Simon, V.V. Bazhenov, N.P. Shapkin, C. Erler, M. Mertig, R. Born, S. Heinemann, T. Hanke, H. Worch, and J.N. Vournakis (2008) Nanostructural Organization of Naturally Occurring Composites—Part II: Silica-Chitin-Based Biocomposites. *Journal of Nanomaterials*, doi: 10.1155/2008/670235 (published online, Article ID 623838, 8 pages) (IF 1.611)
- 15) **Ehrlich H.**, Hanke T., Fischer C., Schwarzenbolz U., Henle T., Born R., Worch H. (2008) Mineralization of biomimetically carboxymethylated collagen fibrills in a model dual membrane diffusion system. *Journal of Membrane Science*, 326: 254-259 (IF 4.908)
- 16) Goffredi S.K., Jones W.J., **Ehrlich H.**, Springer A., Vrijenhoek R.C. (2008) Epibiotic bacteria associated with recently discovered yeti crab *Kiwa hirsuta*. *Environmental Microbiology*, 10(10): 2623-2634 (IF 6.24)
- 17) **Ehrlich H.**, Koutsoukos P., Demadis K., Pokrovsky O. (2009) Principles of Demineralization: Modern Strategies for the Isolation of Organic Frameworks. Part II. Decalcification. *Micron*, 40: 169-193 (IF 2.062)
- 18) **Ehrlich H.**, Hanke T, Born R, Fischer C, Frolov A, Langrock T, Hoffmann R, Schwarzenbolz U, Henle T, Simon P, Geiger D, Bazhenov VV, Worch H (2009) Mineralization of biomimetically carboxymethylated collagen fibrills in a model dual

- membrane diffusion system. *Journal of Membrane Science*. 326: 254-259 (IF 4.908)
- 19) Ehrlich H., Hanke T., Fischer C., Frolov A., Langrock T., Hoffmann R., Schwarzenbolz U., Henle T., Born R., Worch H. (2009) Modification of collagen in vitro with respect to N-Carboxymethyllysine. *International Journal of Biological Macromolecules*, 44: 51-56 (IF 3.096)
  - 20) Brunner E., Ehrlich H., Schupp P., Hedrich R., Hunold S., Kammer M., Machill S., Paasch S., Bazhenov V.V., Kurek D.V., Arnold T., Brockmann S., Ruhnnow M., Born R. (2009) Chitin-based scaffolds are an integral part of the skeleton of the marine demosponge *Ianthella basta*. *Journal of Structural Biology*, 168: 539-547 (IF 3.369)
  - 21) Brunner E., Richthammer P., Ehrlich H., Paasch S., Simon P., Ueberlein S., van Pee K.-H. (2009) Chitin-based organic networks – an integral part of cell wall biosilica from the diatom *Thalassiosira pseudonana*. *Angewandte Chemie International Edition*, 48: 9724-9727 (IF 11.336)
  - 22) Ehrlich H., Hanke T., Fischer C., Frolov A., Langrock T., Hoffmann R., Schwarzenbolz U., Henle T., Born R., Worch H. (2010) Carboxymethylation of collagen with respect to Ca-phosphate phases formation. *Journal of Biomedical Materials Research, Part B. Applied Materials* 92(2): 542-551 (IF 2.328)
  - 23) Born R., Ehrlich H., Bazhenov V.V., Shapkin N.P. (2010) Investigation of Nanoorganized Biomaterials of Marine Origin. *Arabian Journal of Chemistry*, 3: 27-32. (IF 2.684)
  - 24) Ehrlich H., Simon P., Carrillo-Cabrera W., Bazhenov V.V., Botting J., Ilan M., Ereskovsky A.V., Muricy G., Worch H., Mensch A., Born R., Springer A., Kummer K., Vyalikh D.V., Molodtsov S.L., Kurek D.V., Kammer M., Paasch S., Brunner E. (2010) Insights into Chemistry of Biological Materials: Newly Discovered Silica-Aragonite-Chitin Biocomposites in Demosponges. *Chemistry of Materials*, 22(4): 1462-1471 (IF 8.535)
  - 25) Ehrlich H., Demadis K., Pokrovsky O., Koutsoukos P. (2010) Modern Views on Desilicification: Biosilica and Abiotic Silica Dissolution in Natural and Artificial Environments. *Chemical Reviews* 110:4656-4689. (IF 45.661)
  - 26) Steck E., Burkhardt M., Richter W., Ehrlich H. (2010) Discrimination between cells of murine and human origin in xenotransplants by specific genomic in situ hybridization. *Xenotransplantation*, 17:153-159. (IF 1.779)
  - 27) Ehrlich H. (2010) Chitin and Collagen as Universal and Alternative Templates in Biomineralization. *International Geology Review* 52:661-699. (IF 2.663)
  - 28) Ehrlich H., Elkin Y.N., Artyoukov A.A., Kozlovskaya E., Stonik V.A., Safronov P.P., Kurek D.V., Bazhenov V.V., Kummer K., Vyalikh D., Molodtsov S., Sivkov V., Born R., Ruhnnow M., Meissner H., Richter G. (2010) The spines of sand dollar *Scaphechinus mirabilis* (Agassiz 1863): analytical and structural study *Journal of Advanced Microscopy Research*, 5:100-109. (IF 0.839)
  - 29) Ehrlich H., Deutzmann R., Capellini E., Koon H., Solazzo C., Yang Y., Ashford D., Thomas-Oates J., Lubeck M., Baessmann C., Langrock T., Hoffmann R., Wörheide G., Reitner J., Simon P., Ereskovsky A.V., Mertig M., Vyalikh D.V., Molodtsov S.L., Worch H., Brunner E., Smetacek V., Collins M (2010) Mineralization of the Meter-long Biosilica Structures of Glass Sponges is template on Hydroxylated Collagen. *Nature Chemistry*, 2:1084-1088. (IF 23.297)
  - 30) Kammer M., Hedrich R., Ehrlich H., Brunner E., Krafft C. (2010) Spatially resolved determination of the structure and composition of diatom cell walls by Raman and FTIR imaging. *Analytical and Bioanalytical Chemistry*, 398:509-517. (IF 3.578)
  - 31) Ehrlich H., Ilan M., Maldonado M., Muricy G., Bavestrello G., Kljajic Z., Carballo J.L., Shiaparelli S., Ereskovsky A., Schupp P., Born R., Worch H., Bazhenov V.V., Kurek D., Varlamow V., Vyalikh D., Kummer K., Sivkov V.V., Molodtsov S.L., Meissner H., Richter G., Steck E., Richter W., Hunoldt S., Kammer M., Paasch S., Krasokhin V., Patzke G., Brunner E. (2010) Three dimensional chitin-based

- scaffolds from Verongida sponges (Demospongiae: Porifera). Part I. Isolation and Identification of Chitin. *Int. J. Biol. Macromol.*, 47:132-140. (IF 3.096)
- 32) Ehrlich H., Steck E., Ilan M., Maldonado M., Muricy G., Bavestrello G., Kljajic Z., Carballo J.L., Shiaparelli S., Ereskovsky A., Schupp P., Born R., Worch H., Bazhenov V.V., Kurek D., Varlamov V., Vyalikh D., Kummer K., Sivkov V.V., Molodtsov S.L., Meissner H., Richter G., Hunoldt S., Kammer M., Paasch S., Krasokhin V., Patzke G., Brunner E., Richter W. (2010) Three dimensional chitin-based scaffolds from Verongida sponges (Demospongiae: Porifera). Part II. Biomimetic Potential and Applications. *Int. J. Biol. Macromol.*, 47:141-147. (IF 3.096)
- 33) Tabachnick K., Menshenina L., Pisera A., Ehrlich H. (2011) The Hexactinellid Genus *Aspidoscopulia* Reiswig 2002 (Porifera: Hexactinellida: Farreidae) with remarks on branching and metamery. *Zootaxa*, 2883:1-22. (IF 1.060)
- 34) Ehrlich H., Brunner E., Simon P., Bazhenov V.V., Botting J.P., Tabachnick K.R., Springer A., Kummer K., Vyalikh D.V., Molodtsov S.L., Kammer M., Worch H., Kovalev A., Gorb S.N., Koutsoukos P, Summers A. (2011) Calcite reinforced silica-silica joints in the biocomposite skeleton of the deep-sea glass sponge. *Advanced Functional Materials*, 21:3473-3481. (IF 10.439)
- 35) Ehrlich H., Y.N. Elkin, A.A. Artyoukov, E. Kozlovskaya, V.A. Stonik, P.P. Safronov, V.V. Bazhenov, D.V. Kurek, V.P. Varlamov, R. Born, H. Meissner, G. Richter (2011) Simple method for preparation of nanostructurally organized spines of sand dollar *Scaphechinus mirabilis* (Agassiz 1863). *Marine Biotechnology*, 13:402-410. (IF 3.152)
- 36) Spinde K., Kammer M., Freyer K., Ehrlich H., Vournakis J., Brunner E. (2011) Biomimetic Silicification of Chitin from Diatoms. *Chemistry of Materials*, 23:2973-2978. (IF 8.535)
- 37) Connors M., Ehrlich H., Hog M., Godeffroy C., Araya S., Kallai I., Gazit D., Boyce M.C., and Ortiz C. (2012) Three-dimensional Structure of the Shell Plate Assembly of the Chiton *Tonicella marmorea* and its Biomechanical Consequences. *Journal of Structural Biology*, 177:314-328. (IF 3.369)
- 38) Bo M, Bavestrello G., Kurek D., Paasch S., Brunner E., Born R., Galli R., Stelling A.L., Sivkov V.N., Petrova O.V., Vyalikh D., Kummer K., Molodtsov S.L., Nowak D., Nowak J., Ehrlich H. (2012) Isolation and identification of chitin in black coral *Paranthipates larix* (Anthozoa: Cnidaria). *International Journal of Biological Macromolecules*, 51:129-137. (IF 3.096)
- 39) Cruz-Barraza J. A., Carballo J. L., Rocha-Olivares A., Ehrlich H., Hog M. (2012) Integrative Taxonomy and Molecular Phylogeny of Genus *Aplysina* (Demospongiae: Verongida) from Mexican Pacific. *PLoS ONE* 7, e42049. (IF 3.534)
- 40) Ehrlich H., Rigby J.K., Botting J., Tsurkan M., Werner C., Schwille P., Petrusek Z., Pisera A., Simon P., Sivkov V., Vyalikh D., Molodtsov S., Kurek D., Kammer M., Hunoldt S., Born R., Stawski D., Steinhof A., Bazhenov V., Geisler T. (2013) Discovery of 505-million-year old chitin in the basal demosponge *Vauxia gracilenta*. *Nature Scientific Reports*, 3:3497. (IF 5.078)
- 41) Chernogor L., Denikina N., Kondratov I., Solovarov I., Khanaev I., Belikov S., Ehrlich H. (2013) Isolation and identification of microalgal symbiont from the primmorphs of the endemic freshwater sponge *Lubomirskia baikalensis* (Lubomirskiidae, Porifera). *European Journal of Phycology*, 48:497-508. (IF 2.338)
- 42) Wysokowski M., Motylenko M., Stöcker H., Bazhenov V.V., Langer E., Dobrowolska A., Czaczyk K., Galli R., Stelling A.L., Behm T., Klapiszewski L., Ambrozewicz D., Nowacka M., Molodtsov S.L., Abendroth B., Meyer D.C., Kurzydowski K.J., Jesionowski T., Ehrlich H. (2013) An extreme biomimetic approach: Hydrothermal synthesis of  $\beta$ -chitin/ZnO nanostructured composites. *Journal of Materials*

*Chemistry B*, 1: 6469-6476. (IF **6.626**)

- 43) Lukasz K., Wysokowski M., Majchrzak I., Szatkowski T., Nowacka M., Siwinska-Stefanska K., Szwarc-Rzepka K., Bartczak P., **Ehrlich H.**, Jesionowski T. (2013) Preparation and characterization of multifunctional chitin/lignin materials. *Journal of Nanomaterials*, special issue "Nanostructured Surfaces, Coatings, and Films: Fabrication, Characterization, and Application", 425726. (IF **1.611**)
- 44) Wysokowski M., Bazhenov V.V., Tsurkan M.V., Galli R., Stelling A.L., Stöcker H., Kaiser S., Niederschlag E., Gärtner G., Behm T., Ilan M., Petrenko A.Y., Jesionowski T., **Ehrlich H.** (2013) Isolation and Identification of chitin in three-dimensional skeleton of *Aplysina fistularis* marine sponge. *International Journal of Biological Macromolecules*, 62: 94-100. (IF **3.096**)
- 45) **Ehrlich H.**, Simon P., Motylenko M., Wysokowski M., Bazhenov V.V., Galli R., Stelling A.L., Stawski D., Ilan M., Stöcker H., Abendroth B., Born R., Jesionowski T., Kurzydowski K.J., Meyer D.C. (2013) Extreme Biomimetics: Formation of Zirconium Dioxide Nanophase Using Chitinous Scaffolds under Hydrothermal Conditions. *Journal of Materials Chemistry B*, 1: 5092-5099. (IF **6.626**)
- 46) Wysokowski M., Motylenko M., Bazhenov V.V., Stawski D., Petrenko I., Ehrlich A., Behm T., Kljajic Z., Stelling A.L., Jesionowski T., **Ehrlich H.** (2013) Poriferan Chitin as a Template for Hydrothermal Zirconia Deposition. *Frontiers of Materials Science*, 7(3): 248-260.
- 47) **Ehrlich H.**, Kaluzhnaya O., Brunner E., Tsurkan M.V., Ereskovsky A., Ilan M., Tabachnick K.R., Bazhenov V.V., Paasch S., Kammer M., Born R., Stelling A., Galli R., Belikov S., Petrova O.V., Sivkov V., Vyalikh D., Hunoldt S., Wörheide G. (2013) Identification and first insights into the structure and biosynthesis of chitin from the freshwater sponge *Spongilla lacustris*. *Journal of Structural Biology*, 183(3): 474–483. (IF **3.369**)
- 48) Schleuter D., Günther A., Paasch S., **Ehrlich H.**, Kljajic Z., Hanke T., Bernhard G., Brunner E. (2013) Chitin-based renewable materials from marine sponges for uranium adsorption. *Carbohydrate Polymers*, 92(1): 712–718 (IF **3.916**)
- 49) Kunze K., Niemann H., Ueberlein S., Schulze R., **Ehrlich H.**, Brunner E., Proksch P., van Pée K.-H. (2013) Brominated Skeletal Components of the Marine Demosponges, *Aplysina cavernicola* and *Ianthella basta*: Analytical and Biochemical Investigations. *Marine Drugs*, 11(4): 1271-1287. (IF **3.512**)
- 50) **Ehrlich H.**, Kaluzhnaya O.V., Tsurkan M.V., Ereskovsky A., Tabachnick K.R., Ilan M., Stelling A., Galli R., Petrova O.V., Nekipelov S.V., Sivkov V.N., Vyalikh D., Born R., Behm T., Ehrlich A., Chernogor L.I., Belikov S., Janussen D., Bazhenov V.V., Wörheide G. (2013) First report on chitinous holdfast in sponges (Porifera). *Proceedings of the Royal Society B*, 280: 20130339. (IF **5.292**)
- 51) Wysokowski M., Behm T., Born R., Bazhenov V.V., Meißner H., Richter G., Szwarc-Rzepka K., Makarova A., Vyalikh D., Schupp P., Jesionowski T., **Ehrlich H.** (2013) Preparation of chitin-silica composites by *in vitro* silicification of two-dimensional *Ianthella basta* demosponge chitinous scaffolds under modified Stöber conditions. *Materials Science and Engineering C*, 33: 3935-3941. (IF **2.736**)
- 52) Rogulska OY, Mutsenko VV, Revenko EB, Petrenko YA, **Ehrlich H.**, Petrenko AY (2013) Culture and Differentiation of Human Adipose Tissue Mesenchymal Stromal Cells within Carriers Based on Sea Sponge Chitin Skeletons. *Problems of Cryobiology and Cryomedicine* 23: 267-270.
- 53) Pohl T., Al-Muqdad S.W., Ali M.H., Al-Mudaffar Fawzi N., **Ehrlich H.**, Merkel B. (2014) Discovery of a living coral reef in the coastal waters of Iraq. *Nature Scientific Reports* 4:4250. (IF **5.078**)



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## PATENTS

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- 1) **Ehrlich H.**, Heinemann S., Hanke T., Worch H. Hybridmaterialien aus Kollagen und Silikat, Verfahren zu deren Herstellung und deren Verwendung. *DE-PA 10 2006 040 917.5* and *WO 2008/02302*
- 2) **Ehrlich H.**, Brunner E., Richter W., Ilan M., Schupp P. Zwei-oder dreidimensionales gereinigtes Chitingerüst von Hornschwämmen, Verfahren zu seiner Herstellung und Verwendung *DE-PA 10 2009 028 980.1*
- 3) **Ehrlich H.**, Scharnweber D., Worch H., Hanke T., Born R., Bierbaum S. Biopolymere, Verfahren zu deren Herstellung und deren Verwendung zur Herstellung mineralisierte Biomaterialien. *Patent DE 10 2004 058 893 B4* (2010.08.19)
- 4) **Ehrlich H.**, Brunner E., Richter W., Ilan M., Schupp P. Two or three-dimensional cleaned chitin skeleton of dictyoceratid sponges. Method for the production and use thereof *WO 2011/ 023531 A2*

## INVITED LECTURES

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20.06.07

***Sponge Chitin: Biomimetic Potential and Development of New Biomaterials.*** invited by Bayer Innovation GmbH, Düsseldorf, Germany

06.11.07

***Strategies for development of new biomaterials based on sponge skeletons.*** invited by Prof. Greta R. Patzke, ETH Zürich, Switzerland

21.04.08

***Discovery of the novel silica-calcium carbonate biocomposites of marine origin.*** invited by Prof. Matthias Epple, University of Essen, Germany

02.09.08

***Chitin and Collagen as Unified Templates for Calcification and Silicification in Nature.*** invited by Prof. F. Cui, as Keynote Lecture, 10. International Biomineralization Symposium, China

06.05.09

***Biomaterials of marine origin: lessons from biocomposite-based skeletons.*** invited by Prof. G. Bavestrello, University of Ancona, Italy

15.06.09

***Biomineralization-Demineralization-Remineralization Phenomena and Modern Strategies for the Isolation of Organic Matrices.*** invited by Prof. G. Nancollas, as Keynote Lecture, 13th International Conference on Surface & Colloid Science and 83rd ACS Colloid & Surface Science Symposium, Columbia University, New York, USA

16.06.09

***Back to the Roots: Isolation and Identification of Cambrian Chitin.*** invited by Prof. Catherine Scinner, Yale University, New Haven, USA

14.07.09

***Insights in Demineralization: Findings of Novel Biocomposites.*** invited by Prof. Dierk Raabe, MPI für Eisenforschung, Düsseldorf, Germany

23.02.10

***Universal Templating Activity of Chitin and Collagen in Biosilicification.*** invited by

Prof. Ulrich Barthmann, Alfred-Wegener- Institute for Polar and Marine Research, Bremerhaven, Germany

24.02.10

**Skeletal structures of Marine Invertebrates as Sources for Biomimetics.** invited by Prof. Stanislav Gorb, Zoological Institute, Functional Morphology and Biomechanics Dept., Christian-Albrechts-Universität zu Kiel, Kiel, Germany

29.03.10

**Multiphase Biomineralization in Nature.** invited by Prof. Catherine Skinner, Yale University, New Haven, USA

30.03.10

**Layered Structures in Skeletal Formations of Marine Invertebrates: Origin, Principles of Organization and Functions.** invited by Prof. Christine Ortiz, Dept. of Materials Science and Engineering, Massachusetts Institute of Technology, Cambridge, USA

31.03.10

**Universal and Alternative Templates in Biomineralization: Chitin and Collagen.** invited by Prof. Markus Buehler, Dept. of Civil and Environmental Engineering, MIT, Cambridge, USA

12.05.10

**Biosilicification: a modern view on templating activities of organic matrices.** invited by Prof. Kostas Demadis, Dept. of Chemistry, University of Crete, Heraklion, Greece

30.05.10

**Nanoorganized Naturally Occurring Composites.** invited by Prof. Michael Gelinsky. Max Bergmann Centre of Biomaterials TU Dresden, Germany

21.09.10

**Insights into Structural Biology of Marine Sponges.** Keynote Lecture VIII World Sponge Conference, Girona, 20 to 24 Sept. 2010

22.10.10

**Modern View on Templating activity of Organic Matrices in Biomineralization.** invited by Prof. Gert Wörheide "Frontiers in Earth Sciences Seminar", Ludwig-Maximilians-Universität München, Germany

18.11.10

**Nanoorganized biocomposites: from biomimetic potential to development of new biomaterials.** invited by Prof Gianaurelio Cuniberti, Nanoseminar, Dresden University of Technology and MBZ

01.12.10

**Silicification in Sponges.** invited by Prof. Joachim Reitner, Geobiocentre, University of Göttingen

09.12.10

**Nanostruktur-Organisation natürlich vorkommender Komposite.** Invited by Prof. Michael Mertig, Dresden University of Technology

12.07.11

**Biosilicification: insights, trends and open questions.** Invited keynote lecture, BIOMIN'11 International Symposium on Biomineralization, Brisbane, Australia

01.02.12

**Extreme Biomimetics: New Direction for Development of Bio-Inspired Materials.** Invited by Prof. Jens Kortus, TU Bergakademie Freiberg

23.04.12

**Introduction to Extreme Biomimetics.** Invited by Prof. Dawid Stawski, Lodz University of Technology, Lodz, Poland

25.04.12

**Nanoorganized biocomposites: from biomimetic potential to development of new biomaterials.** Invited by Prof. Dawid Stawski, Lodz University of Technology, Lodz, Poland

03.07.12

**Modern trends in biomaterials science and extreme biomimetics.** Invited by Prof. K. J. Kurzydowski, Warsaw University of Technology, Warsaw, Poland

14.05.14

**Insights into Extreme Biomimetics.** Invited by Prof. F. Natalio, GDCh-Kolloquium, University of Halle

02.06.14

**The World of Biosilica: Diversity, Insights and Biological Materials Science.** Invited by Prof. I. Nowak, Adam Mickiewicz University, Poznań, Poland

25.09.14

**Poriferan Chitin as new source for extreme biomimetics.** XX Conference of Polish Chitin Society, Invited by prof. M.M. Jaworska, Warsaw Technical University, Lodz, Poland.

09.01.2015

**Biom mineralization and marine sponges.** Annual Meeting of Scientific Diving Center, TU Bergakademie Freiberg. Invited by Prof. Broder Merkel, TU Bergakademie Freiberg

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- 2) Born R., **Ehrlich H.** (2008) Vibrational Spectroscopy of Nanoorganized Biomaterials of Marine Origin. 6<sup>th</sup> International Nanotechnology Symposium, Nanofair 2008, March 11-12, 2008, Dresden, Germany (accepted as lecture)
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- 4) **Ehrlich H.**, Brunner E. (2009) Phenomenon of Multiphase Biomineralization: Silica-Chitin\_Aragonite and Silica-Calcite Biocomposites Within Skeletal Formations of Marine Sponges. Material Research Society Spring Meeting, San Francisco, USA, April, 14-17, 2009, Abstract Book, p. 264. (accepted as oral presentation)
- 5) **Ehrlich H.**, (2009) Biomineralization-Demineralization-Remineralization Phenomena and Modern Strategies for the Isolation of Organic Matrices. 13th International Conference on Surface & Colloid Science and 83rd ACS Colloid & Surface Science

- Symposium, Columbia University, New York City, June 14-19, 2009, abstract Book, p.16. (invited keynote lecture)
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  - 7) **Ehrlich H.**, Brunner E. (2009) Aragonite-Silica and Calcite-Silica Biocomposites: Novel Hybrid Materials Found in Marine Sponges. Hybrid Materials, First International Conference on Multifunctional, Hybrid and Nanomaterials, 15-19 March 2009, Tours, France (oral presentation)
  - 8) **Ehrlich H.**, Born R., Bazhenov V.V., Shapkin N.P., Kammer M., Brunner E. (2009) Analytics of new nanostructured biocomposites in marine sponges. Nanofair-2009, 7<sup>th</sup> International Nanotechnology Symposium, 26-27 May 2009, Dresden, Germany (oral presentation)
  - 9) **Ehrlich H.**, Brunner E., Paasch S., Kammer M., Ilan M., Bavestrello G., Schiaparelli S., Ereskovsky A., Kljajic Z., Carballo J.L., Born R., Bazhenov V., Shapkin N., Kurek D., Varlamov V. (2009) Chitin of poriferan origin: isolation, identification and structural properties. 9<sup>th</sup> International Conference of the European Chitin Society, 23-27 May, Venice, Italy, Conference Book, p. 139
  - 10) Kurek D.V., Varlamov V.P., **Ehrlich H.** Three-dimensional chitinous matrices from marine sponges and their future applications for biotechnology.// Proceedings of International Conference on Biomolecular Science in Honor of the 75th Anniversary of the Birth of Professor Yuri Ovchinnikov. V. 2, pp. 124-125, Moscow, 2009
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  - 12) **Ehrlich H.**, Kurek D., Hunoldt S., Simon P., Sivkov V., Tsurkan M., Born R., Pisera A., Rigby J.K. Isolation and identification of chitin from *Vauxia gracilenta* fossil sponge. VIII World Sponge Conference, Girona 20-24 September 2010, Book of Abstracts, p. 182.
  - 13) **Ehrlich H.**, Bazhenov V., Kurek D. Unique form of silica within skeletal fibres of Verongida sponges. VIII World Sponge Conference, Girona 20-24 September 2010, Book of Abstracts, p. 183.
  - 14) Hunoldt S., Kurek D., Paasch S., Brunner E., **Ehrlich H.** Chitosan of poriferan origin. VIII World Sponge Conference, Girona 20-24 September 2010, Book of Abstracts, p. 221.
  - 15) Kurek D., Varlamov V., Bazhenov V., Vyalikh D., Molodtsov S., Born R., **Ehrlich H.** Isolation and identification of chitin within fibrous skeletons of Verongida sponges. VIII World Sponge Conference, Girona 20-24 September 2010, Book of Abstracts, p. 235.
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  - 17) Kurek D., Custodio M., **Ehrlich H.** Structural diversity of silica-based formations in freshwater sponge *Drulia brownii* (Metaniidae: Demospongiae). VIII World Sponge Conference, Girona 20-24 September 2010, Book of Abstracts, p. 237.
  - 18) Kurek D., Assal Y., Born R., Kammer M., Ehrlich A., Kljajic Z., **Ehrlich H.** Comparative investigations of nature and origin of skeletal organic matrices of *Aplysina aerophoba* (Verongida) and *Dysidea avara* (Dendroceratida). VIII World Sponge Conference, Girona 20-24 September 2010, Book of Abstracts, p. 238.
  - 19) **Ehrlich H.** Insights into structural biology of marine sponges. VIII World Sponge Conference, Girona 20-24 September 2010, Book of Abstracts, p. 49.

- 20) **Ehrlich H.** Extreme Biomimetics: New Direction for Development of Bio-Inspired Materials, Euro Bio-inspired Materials Conference, Potsdam 20-23 March 2012, oral presentation
- 21) Wysokowski M., **Ehrlich H.**, Jesionowski T. Extreme biomimetic synthesis of chitin/silica composites, International Conference on Biobased Polymers and Composites Lake Balaton, May 27-31, 2012 (526) – poster presentation
- 22) Wysokowski M., **Ehrlich H.**, Jesionowski T. Synthesis and characterization of novel  $\alpha$ -chitin/nanosilica composites, International Conference on Biobased Polymers and Composites – BiPoCo 2012 Lake Balaton, May 27-31, 2012 (527), oral presentation
- 23) Wysokowski M., **Ehrlich H.**, Jesionowski T. Synthesis and characterisation of novel chitin/ZrO<sub>2</sub> composites 15th European Conference on Composite Materials – ECCM 15th Venice, June 24-28, 2012 (1751), oral presentation
- 24) Pisera A., Kurek D., Simon P., Sivkov V., Tsurkan M., Wysokowski M., **Ehrlich H.** Demineralization of Cambrian demosponge *Vauxia gracilenta*: Isolation and identification of skeletal chitin. 12th International Symposium on Biomineralization (Biomin 12), 27 - 30 August 2013, Freiberg, Germany, poster
- 25) Zgłobicka I., Wysokowski M., Kaiser S., Bazhenov V.V., Makarova A., Vyalikh D., Zawadzak E., Zdunek J., Płocińska M., Płociński T., Motylenko M., Noga T., Sundareshwar P.V., Witkowski A., Kurzydłowski K.J., **Ehrlich H.** First investigations into biominerals formation within stalks of fouling diatom *Didymosphenia geminata*. 12th International Symposium on Biomineralization (Biomin 12), 27 - 30 August 2013, Freiberg, Germany, poster
- 26) Petrova O., Sivkov V., Nekipelov S., Vyalikh D., Molodtsov S., Bazhenov V., **Ehrlich H.** Application of the NEXAFS-spectroscopy for biominerals analysis. 12th International Symposium on Biomineralization (Biomin 12), 27 - 30 August 2013, Freiberg, Germany, poster
- 27) Ueberlein S., Kunze K., Niemann H., Schulze R., **Ehrlich H.**, Brunner E., Proksch P., van Pée K.-H. Brominated skeletal components of the marine demosponges *aplysina cavernicola* and *ianthella basta*. 12th International Symposium on Biomineralization (Biomin 12), 27 - 30 August 2013, Freiberg, Germany, poster
- 28) Jesionowski T., Wysokowski M., Ehrlich A., Kljajic Z., Szatkowski T., Stawski D., **Ehrlich H.** *In vitro* extreme biomimetic silicification of 3D chitinous scaffolds isolated from *Aplysina aerophoba* marine sponge skeleton. 12th International Symposium on Biomineralization (Biomin 12), 27 - 30 August 2013, Freiberg, Germany, poster
- 29) Wysokowski M., Bazhenov V.V., **Ehrlich H.**, Jesionowski T. Extreme biomimetic mineralization of poriferan chitin with use of polyhedral oligomeric silsesquioxanes (POSS). 12th International Symposium on Biomineralization (Biomin 12), 27 - 30 August 2013, Freiberg, Germany, poster
- 30) Szatkowski T., Wysokowski M., Bazhenov V., **Ehrlich H.**, Jesionowski T. Preparation of silica-spongin biocomposite under hydrothermal conditions. 12th International Symposium on Biomineralization (Biomin 12), 27 - 30 August 2013, Freiberg, Germany, poster
- 31) Szatkowski T., Bazhenov V.V., Wysokowski M., Motylenko M., Jesionowski T., **Ehrlich H.**, Novel Nanostructured Hematite-Spongin Biocomposites obtained using Fibrous Skeleton of Hippospongia Communis Marine Sponge via Hydrothermal Route, Euro Bio-Inspired Materials Conference 2014, 18-21.03.2014 Potsdam, Germany, Oral presentation.
- 32) Wysokowski M., Szatkowski T., Bazhenov V.V., Motylenko M., Petrenko I., Jesionowski T., **Ehrlich H.**, Extreme biomimetic approach for synthesis of advanced organic-inorganic chitin-based composites. Euro Bio-Inspired Materials Conference 2014, 18-21.03.2014 Potsdam, Germany, Oral presentation.
- 33) Milczarek G., Modrzejewska-Sikorska A., Klapiszewski L., Wysokowski M., **Ehrlich H.**, Jesionowski T., Lignosulfonate-Mediated Synthesis of Silica/Nanosilver Composites. BaltSilica 2014, 01.-03.06.2014, Poznan, Poland, Poster.
- 34) **Ehrlich H.**, The World of Biosilica: Diversity, Insights and Biological Materials

- Science. BaltSilica 2014, 01.-03.06.2014, Poznan, Poland, Keynote lecture.
- 35) Wysokowski M., Szatkowski T., Petrenko I., Bazhenov V.V., Kaiser S., Jesionowski T., **Ehrlich H.**, Extreme Biomimetic Approach for Development of Novel Chitin-based Hybrid Materials. XX Conference of Polish Chitin Society, 24-26.09.2014 Łódź, Poland (**1<sup>st</sup> Award for the best presentation**), Oral presentation.
  - 36) **Ehrlich H.**, Poriferan chitin as new source for extreme biomimetics. XX Conference of Polish Chitin Society – New Aspects in chemistry and applications of chitin and its derivatives, 24.–26.09.2014, Łódź, Poland, Keynote lecture.
  - 37) Szatkowski T., Wysokowski M., Petrenko I., Bazhenov V.V., Jesionowski T., **Ehrlich H.**, Extreme Biomimetics: Development of 3D spongin-based biocomposites via hydrothermal route. Jahrestagung der Deutschen Gesellschaft für Biomaterialien, 06-08.11.2014 Dresden, Germany – poster
  - 38) Wysokowski M., Petrenko I., Szatkowski T., Kaiser S., Bazhenov V.V., Kutsova V.Z., Jesionowski T., **Ehrlich H.**, Extreme Biomimetic Strategies on Duty for Biomaterials Science, Jahrestagung der Deutschen Gesellschaft für Biomaterialien, 06-08.11.2014 Dresden, Germany, Poster.

Additional Info: [www.biomin2013.de](http://www.biomin2013.de)

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[www.tu-freiberg.de/exphys/biomineralogy-and-extreme-biomimetics](http://www.tu-freiberg.de/exphys/biomineralogy-and-extreme-biomimetics)