

Nicole Poulsen, Ph.D.  
Academic Staff  
Chair of Biomimetic Materials  
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## Qualifications

PhD, PhD, University of Melbourne  
1 Jan 1997 → 1 Sept 2001  
Award Date: 1 Sept 2001

Bachelor, Bachelor of Science, University of Melbourne  
1 Mar 1992 → 31 Dec 1996  
Award Date: 31 Dec 1996

## Employment

### Academic Staff

Chair of Biomimetic Materials  
Technische Universität Dresden  
1 Jan 2014 → present

## Research outputs

### **Thalassiosira pseudonana(Cyclotella nana) (Hustedt) Hasle et Heimdal (Bacillariophyceae): A genetically tractable model organism for studying diatom biology, including biological silica formation**

Poulsen, N. & Kroeger, N., Oct 2023, In: Journal of Phycology. 59, 5, 9 p.

### **On the role of cell surface associated, mucin-like glycoproteins in the pennate diatom Craspedostauros australis (Bacillariophyceae)**

Poulsen, N., Hennig, H., Geyer, V. F., Diez, S., Wetherbee, R., Fitz-Gibbon, S., Pellegrini, M., & 1 othersKröger, N., 5 Oct 2022, In: Journal of Phycology. 2022, 16 p.

### **Shedding light on silica biomineralization by comparative analysis of the silica-associated proteomes from three diatom species**

Skeffington, A. W., Gentzel, M., Ohara, A., Milentyev, A., Heintze, C., Boettcher, L., Goerlich, S., & 3 othersShevchenko, A., Poulsen, N. & Kroeger, N., Jun 2022, In: The plant journal. 110, 6, p. 1700-1716 17 p.

### **Diatom adhesion and motility**

Poulsen, N., Davutoglu, M. G. & Žáčková Suchanová, J., 2022, *The Molecular Life of Diatoms*. Falciatore, A. & Mock, T. (eds.). Springer Nature , p. 367-393 27 p.

### **Diurnal transcript profiling of the diatom *Seminais robusta* reveals adaptations to a benthic lifestyle**

Bilcke, G., Osuna-Cruz, C. M., Santana Silva, M., Poulsen, N., D'hondt, S., Bulankova, P., Vyverman, W., & 2 othersDe Veylder, L. & Vandepoele, K., Jul 2021, In: The plant journal. 107, 1, p. 315-336 22 p.

### **Mating type specific transcriptomic response to sex inducing pheromone in the pennate diatom *Seminais robusta***

Bilcke, G., Van den Berge, K., De Decker, S., Bonneure, E., Poulsen, N., Bulankova, P., Osuna-Cruz, C. M., & 8 othersDickenson, J., Sabbe, K., Pohnert, G., Vandepoele, K., Mangelinckx, S., Clement, L., De Veylder, L. & Vyverman, W., Feb 2021, In: ISME Journal. 15, 2, p. 562-576 15 p.

### **The *Seminais robusta* genome provides insights into the evolutionary adaptations of benthic diatoms (vol 11, 3320, 2020)**

Osuna-Cruz, C. M., Bilcke, G., Vancaester, E., De Decker, S., Bones, A. M., Winge, P., Poulsen, N., & 18 othersBulankova, P., Verhelst, B., Audoor, S., Belisova, D., Pargana, A., Russo, M., Stock, F., Cirri, E., Brembu, T., Pohnert, G., Piganeau, G., Ferrante, M. I., Mock, T., Sterck, L., Sabbe, K., De Veylder, L., Vyverman, W. & Vandepoele, K., 16 Oct 2020, In: Nature communications. 11, 1, 5331.

### **Genetically Programmed Regioselective Immobilization of Enzymes in Biosilica Microparticles**

Kumari, E., Görlich, S., Poulsen, N. & Kröger, N., 18 Jun 2020, In: *Advanced functional materials*. 30, 25, 13 p., 2000442.

### **Chitin synthase localization in the diatom *Thalassiosira pseudonana***

Poulsen, N., Wustmann, M., Kröger, N. & Pée, K-H., 2020, In: *BMC materials*. 2, 10.

### **Identification of proteins in the adhesive trails of the diatom *Amphora coffeaeformis***

Lachnit, M., Buhmann, M. T., Klemm, J., Kroeger, N. & Poulsen, N., 9 Sept 2019, In: *Philosophical Transactions of the Royal Society B: Biological Sciences*. 374, 1784, 9 p., 20190196.

### **Biom mineralization as a Paradigm of Directional Solidification: A Physical Model for Molluscan Shell Ultrastructural Morphogenesis**

Schoepler, V., Granasy, L., Reich, E., Poulsen, N., de Kloe, R., Cook, P., Rack, A., & 2 othersPusztai, T. & Zlotnikov, I., Nov 2018, In: *Advanced materials*. 30, 45, 1803855.

### **Establishing super-resolution imaging for proteins in diatom biosilica**

Groger, P., Poulsen, N., Klemm, J., Kroger, N. & Schlierf, M., 9 Nov 2016, In: *Scientific reports*. 6, 8 p., 36824.

### **Biochemical Composition and Assembly of Biosilica-associated Insoluble Organic Matrices from the Diatom *Thalassiosira pseudonana***

Kotzsch, A., Pawolski, D., Milentyev, A., Shevchenko, A., Scheffel, A., Poulsen, N., Shevchenko, A., & 1 othersKroeger, N., 4 Mar 2016, In: *Journal of Biological Chemistry*. 291, 10, p. 4982-4997 16 p.

### **Isolation and biochemical characterization of underwater adhesives from diatoms**

Poulsen, N., Kröger, N., Harrington, M. J., Brunner, E., Paasch, S. & Buhmann, M. T., Apr 2014, In: *Biofouling*. 30, 4, p. 513-523 11 p.

### **NITRATE AND CARBONATE CONCENTRATION FOR HIGH GLUCOSE CONTENT IN MICROALGAE**

Kroger, N., Poulsen, N. & Miller, S. J., 30 Jan 2014, IPC (International Patent Classification) C12M 1/00 A I, Patent No. WO2014018338, Priority date 23 Jul 2012, Priority No. US201213556048

### **A Tyrosine-rich Cell Surface Protein in the Diatom *Amphora coffeaeformis* identified through Transcriptome Analysis and Genetic Transformation**

Buhmann, M. T., Poulsen, N., Klemm, J., Kröger, N. & Kennedy, M. R., 2014, In: *PLoS ONE*.

### **Pentylsine clusters mediate silica targeting of silaffins in *Thalassiosira pseudonana***

Poulsen, N., Scheffel, A., Sheppard, V. C. & Kröger, N., 12 Jul 2013, In: *Journal of Biological Chemistry*. 288, 28, p. 20100-20109 10 p.

### **Live Diatom Silica Immobilization of Multimeric and Redox-Active Enzymes**

Sheppard, V. C., Scheffel, A., Poulsen, N. & Kroeger, N., Jan 2012, In: *Applied and environmental microbiology*. 78, 1, p. 211-218 9 p.

### **A Systematic Screen to Discover and Analyze Apicoplast Proteins Identifies a Conserved and Essential Protein Import Factor**

Poulsen, N., 1 Dec 2011, In: *PLOS pathogens*. 7, 12, e1002392.

### **Nanopatterned protein microrings from a diatom that direct silica morphogenesis**

Scheffel, A., Poulsen, N., Shian, S. & Kröger, N., 22 Feb 2011, In: *Proceedings of the National Academy of Sciences of the United States of America : PNAS*. 108, 8, p. 3175-3180 6 p.

### **Characterization of an Endoplasmic Reticulum-associated Silaffin Kinase from the Diatom *Thalassiosira pseudonana***

Sheppard, V., Poulsen, N. & Köger, N., 8 Jan 2010, In: *Journal of Biological Chemistry*. 285, 2, p. 1166-1176 11 p.

### **Protein-Mediated Layer-by-Layer Syntheses of Freestanding Microscale Titania Structures with Biologically Assembled 3-D Morphologies**

Fang, Y., Wu, Q., Dickerson, M. B., Cai, Y., Shian, S., Berrigan, J. D., Poulsen, N., & 2 others Kroeger, N. & Sandhage, K. H., 22 Dec 2009, In: *Chemistry of materials*. 21, 24, p. 5704-5710

### **Protein-Enabled Synthesis of Monodisperse Titania Nanoparticles On and Within Polyelectrolyte Matrices**

Kharlampieva, E., Slocik, J. M., Singamaneni, S., Poulsen, N., Kroeger, N., Naik, R. R. & Tsukruk, V. V., 24 Jul 2009, In: *Advanced functional materials*. 19, 14, p. 2303-2311 9 p.

### **The Phaeodactylum genome reveals the evolutionary history of diatom genomes**

Bowler, C., Allen, A. E., Badger, J. H., Grimwood, J., Jabbari, K., Kuo, A., Maheswari, U., & 70 others Martens, C., Maumus, F., Otilar, R. P., Rayko, E., Salamov, A., Vandepoele, K., Beszteri, B., Gruber, A., Heijde, M., Katinka, M., Mock, T., Valentin, K., Verret, F., Berges, J. A., Brownlee, C., Cadoret, J-P., Chiovitti, A., Choi, C. J., Coesel, S., De Martino, A., Detter, J. C., Durkin, C., Falciatore, A., Fournet, J., Haruta, M., Huysman, M. J. J., Jenkins, B. D., Jiroutova, K., Jorgensen, R. E., Joubert, Y., Kaplan, A., Kröger, N., Kroth, P. G., La Roche, J., Lindquist, E., Lommer, M., Martin-Jezequel, V., Lopez, P. J., Lucas, S., Mangogna, M., McGinnis, K., Medlin, L. K., Montsant, A., Oudot-Le Secq, M-P., Napoli, C., Obornik, M., Parker, M. S., Petit, J-L., Porcel, B. M., Poulsen, N., Robison, M., Rychlewski, L., Rynearson, T. A., Schmutz, J., Shapiro, H., Siaut, M., Stanley, M., Sussman, M. R., Taylor, A. R., Vardi, A., von Dassow, P., Vyverman, W., Willis, A., Wyrwicz, L. S., Rokhsar, D. S., Weissenbach, J., Armbrust, E. V., Green, B. R., Van de Peer, Y. & Grigoriev, I. V., 13 Nov 2008, In: *Nature*. 456, 7219, p. 239-244

### **Bioenabled surface-mediated growth of titania nanoparticles**

Kharlampieva, E., Tsukruk, T., Slocik, J. M., Ko, H., Poulsen, N., Naik, R. R., Kröger, N., & 1 others Tsukruk, V. V., 3 Sept 2008, In: *Advanced materials*. 20, 17, p. 3274-3279 5 p.

### **Biochemistry and Molecular Genetics of Silica Biomineralization in Diatoms**

Kröger, N. & Poulsen, N., 20 Mar 2008, *Handbook of Biomineralization: Biological Aspects and Structure Formation*. Wiley-VCH, Weinheim [u. a.], Vol. 1. p. 43-58 16 p.

### **Diatoms—From Cell Wall Biogenesis to Nanotechnology**

Kröger, N. & Poulsen, N., 2008, In: *ANNUAL REVIEW OF GENETICS*. 42, p. 83-107 24 p.

### **Identification of peptides capable of inducing the formation of titania but not silica via a subtractive bacteriophage display approach**

Fang, Y., Poulsen, N., Dickerson, M. B., Cai, Y., Jones, S. E., Naik, R. R., Kröger, N., & 1 others Sandhage, K. H., 2008, In: *Journal of materials chemistry*. 18, 32, p. 3871-3875 5 p.

### **Silica Immobilization of an Enzyme through Genetic Engineering of the Diatom *Thalassiosira pseudonana***

Poulsen, N., Berne, C., Spain, J. & Kröger, N., 2007, In: *Angewandte Chemie - International Edition*. 119, 11, p. 1875-1878 4 p.

### **Bioenabled synthesis of rutile (TiO<sub>2</sub>) at ambient temperature and neutral pH**

Kroger, N., Dickerson, M. B., Ahmad, G., Cai, Y., Haluska, M. S., Sandhage, K. H., Poulsen, N., & 1 others Sheppard, V. C., 2006, In: *Angewandte Chemie - International Edition*. 45, 43, p. 7239-7243

### **MOLECULAR GENETIC MANIPULATION OF THE DIATOM THALASSIOSIRA PSEUDONANA (BACILLARIOPHYCEAE)**

Poulsen, N., Chesley, P. & Kröger, N., 2006, In: *Journal of Phycology*. 42, 5, p. 1059-1065 7 p.

### **A new molecular tool for transgenic diatoms: Control of mRNA and protein biosynthesis by an inducible promoter-terminator cassette**

Poulsen, N. & Kröger, N., Jul 2005, In: *FEBS Journal*. 272, 13, p. 3413-3423 11 p.

### **Biosilica nanofabrication in diatoms: The structures and properties of regulatory silaffins**

Kröger, N. & Poulsen, N., 2005, *Biological and Bio-Inspired Materials and Devices*. Materials Research Society, p. 1-6 6 p. (Materials Research Society Symposium Proceedings, Vol. 873).

**Silica morphogenesis by alternative processing of silaffins in the diatom *Thalassiosira pseudonana***  
Poulsen, N. & Kröger, N., 8 Oct 2004, In: *Journal of Biological Chemistry*. 279, 41, p. 42993-42999 7 p.

**Biosilica formation in diatoms: Characterization of native silaffin-2 and its role in silica morphogenesis**  
Poulsen, N., Sumper, M. & Kröger, N., 24 Sept 2003, In: *Proceedings of the National Academy of Sciences of the United States of America : PNAS*. 100, 21, p. 12075-12080 6 p.

**Diatom gliding is the result of an actin-myosin motility system**  
Poulsen, N., Spector, I., Spurck, T., Schultz, T. & Wetherbee, R., 1999, In: *Cell Motility and the Cytoskeleton*. 44, 1, p. 23-33 11 p.

**Phylogenetic Diversity of Parabasalian Symbionts from Termites, Including the Phylogenetic Position of *Pseudotrypanosoma* and *Trichonympha***  
Poulsen, N., Nov 1998, In: *Journal of Eukaryotic Microbiology*. 45, 6, p. 643-650 8 p.

## Activities

### Diatom Gliding

Poulsen, N. (Speaker)  
10 Nov 2022

### Journal of Phycology (Journal)

Poulsen, N. (Associate editor)  
1 Jan 2022 → ...

### The Molecular Life of Diatoms

Mock, T. (Organiser), Poulsen, N. (Organiser), Allen, A. (Organiser), Bones, A. (Organiser), Falciatore, A. (Organiser), Kroth, P. (Organiser), Thamatrakoln, K. (Organiser), Young, J. (Organiser)  
14 Jul 2019 → 18 Jul 2019

### Understanding the molecular mechanism of diatom underwater adhesion

Poulsen, N. (Speaker)  
2019

### Trailins: a new protein family in the adhesive trails of diatoms

Poulsen, N. (Speaker), Kröger, N. (Involved person)  
9 Jul 2017 → 13 Jul 2017

### A Sticky Situation: Unraveling the Secrets of Diatom Adhesion & Motility

Poulsen, N. (Speaker)  
6 Mar 2017 → 7 Mar 2017

### A sticky situation: understanding the mechanism of diatom adhesion

Poulsen, N. (Speaker), Kröger, N. (Involved person)  
20 Jun 2016 → 24 Jun 2016

### Isolation and biochemical characterization of underwater adhesives from diatoms

Poulsen, N. (Speaker)  
6 Jul 2014 → 10 Jul 2014

### Diatoms: Life in a Glasshouse

Poulsen, N. (Speaker)  
5 May 2014 → 7 May 2014

**Phycologia (Journal)**  
Poulsen, N. (Associate editor)  
1 Jan 2012 → 31 Dec 2014