

Dr. Alexander Deiters

Associate Professor
North Carolina State University
Department of Chemistry
Campus Box 8204
Raleigh, NC 27695-8204
USA

☎ 919-513-2958
📄 919-515-5079
✉ alex_deiters@ncsu.edu
🌐 <http://www4.ncsu.edu/~adeiter/>

Education (University of Münster, Germany)

Ph.D. defense, grade: *summa cum laude* (10/2000)
Ph.D. studies under the supervision of Professor D. Hoppe (2/1998-10/2000)

Diploma exam, grade: *with highest honors* (1/1998)
Diploma thesis under the supervision of Professor D. Hoppe (4/1997-1/1998)
Major in chemistry with additional qualifications in biochemistry (10/1995-4/1997)

Intermediate diploma exam, grade: *very good* (10/1995)
Basic chemistry studies (9/1993-9/1995)

Professional and Teaching Experience

North Carolina State University, North Carolina: Associate Professor (early tenure) in the Department of Chemistry (since 8/2009).

North Carolina State University, North Carolina: Associate Member of the Department of Molecular and Structural Biochemistry (since 1/2008).

North Carolina State University, North Carolina: Assistant Professor in the Department of Chemistry (7/2004-7/2009).

The Scripps Research Institute, California: Postdoctoral work under the supervision of Professor P. G. Schultz on: "Synthesis of New Protein Functions by *In Vivo* Incorporation of Unnatural Amino Acids" (9/2002-6/2004).

The University of Texas at Austin, Texas: Postdoctoral work under the supervision of Professor S. F. Martin on: "Total and Formal Syntheses of Sarpagine, Corynantheane, and Oxindole Alkaloids" (3/2001-8/2002).

University of Münster, Germany: Teaching Assistant for the undergraduate course "Chemistry for Medical Students" and the graduate courses "Bioactive Organic Molecules – Stereochemistry" and "Lab Course for Advanced Students in Organic Chemistry" (10/1998-2/2000).

Pharmaceutical Research, Bayer AG, Germany: Internship in medicinal chemistry on: "Solid Phase Synthesis of a Nuclear Receptor Agonist Library Applying IRORI™ Microcan Technology" (5/2000-6/2000).

University of Münster, Germany: Graduate studies under the supervision of Professor D. Hoppe on: "Enantioselective Intramolecular Allyllithium-Allylchloride Couplings – Synthesis of Three- to Nine-membered Carbocycles" (2/1998-10/2000).

University of Münster, Germany: Diploma thesis under the supervision of Professor D. Hoppe on: "Studies towards Enantioselective Intramolecular Metalla-Ene Reactions of 2,7-Alkadienyl Carbamates" (4/1997-1/1998).

Awards and Fellowships

- American Chemical Society – Teva USA Scholar Grant (2009-2012)
- National Science Foundation – Faculty Early Career Development (CAREER) Award (2009-2014)
- Arnold and Mabel Beckman Foundation – Beckman Young Investigator Award (2007-2010)
- Research Corporation – Cottrell Scholar Award (2007-2010)
- Sigma Xi Faculty Research Award (2007)
- CEM Corporation – MJ Collins Award (2007)
- March of Dimes Foundation – Basil O'Connor Scholar Award (2006-2008)
- The Scripps Society of Fellows – Fall Symposium Lecture Award (2003)
- Postdoctoral Fellowship of the German Research Foundation (2002-2003)
- Award for the best dissertation at the Departments for Natural Sciences, Mathematics, and Computer Science in 2001, University of Münster (2002)
- Feodor-Lynen Postdoctoral Fellowship of the Alexander von Humboldt-Foundation (2001-2002)
- Fellowship for Travel Expenses awarded by the SmithKline Beecham Foundation, IKCOC-8, Kyoto/Japan (2000)
- Research Prize for Young Chemists '99 awarded by the German Chemical Society (1999)
- Pfizer-Award for an Outstanding Poster Presentation, Drug Discovery '99, Pfizer, Sandwich/UK (1999)
- Fellowship for Travel Expenses awarded by the German Chemical Society, 11th ORCHEM, Bad Nauheim/Germany (1998)
- Predoctoral Fellowship of the Fund of the Chemical Industry (1998-2000)
- Fellowship of the German National Academic Foundation (1996-1997)

Publications – Peer Reviewed (* denotes publications from graduate and postdoctoral work)

- [53] Deiters, A. "Principles and Applications of the Photochemical Control of Cellular Processes", *ChemBioChem*. **2009**, 10, submitted.
Invited review article.
- [52] Deiters, A. "Small Molecule Modifiers of the MicroRNA and RNA Interference Pathway", *AAPS J.* **2009**, submitted.
Invited review article for a special issue.
- [51] Young, D. D.; Teske, J. A.; Deiters, A. "Open-Vessel Microwave-Mediated [2+2+2] Cyclotrimerization Reactions", *Synthesis* **2009**, accepted.
- [50] Deiters, A. "Light Activation as a Method of Regulating and Studying Gene Expression", *Curr. Opin. Chem. Biol.* **2009**, submitted.
Invited review article for a special issue.
- [49] Chou, C.; Young, D. D.; Deiters, A. "A Light-Activated DNA Polymerase", *Angew. Chem. Int. Ed.* **2009**, 121, 6064-6067.
- [48] Nguyen, D. P.; Lusic, H.; Neumann, H.; Kapadnis, P. B.; Deiters, A.; Chin, J. "Genetic Encoding and Labeling of Aliphatic Azides and Alkynes in Recombinant Proteins via a Pyrrolysyl-tRNA Synthetase/tRNA_{CUA} Pair and Click Chemistry", *J. Am. Chem. Soc.* **2009**, 131, 8720-8721.
- [47] Edwards, W. F.; Young, D. D.; Deiters, A. "Light-Activated Cre Recombinase as a Tool for the Spatial and Temporal Control of Gene Function in Mammalian Cells", *ACS Chem. Biol.* **2009**, 4, 441-445.
- [46] Bereman, M. S.; Young, D. D.; Deiters, A.; Muddiman, D. C. "Development of a Robust and High Throughput Method for Profiling N-linked Glycans Derived from Plasma Glycoproteins by Nano LC FT-ICR Mass Spectrometry", *J. Proteome Res.* **2009**, 8, 3764-3770.

- [45] Young, D. D.; Govan, J. M.; Lively, M. O.; Deiters, A. "Photochemical Regulation of Restriction Endonuclease Activity", *ChemBioChem* **2009**, *10*, 1612-1616.
- [44] Edwards, W. F.; Young, D. D.; Deiters, A. "The Effect of Microwave Irradiation on DNA Hybridization", *Org. Biomol. Chem.* **2009**, *7*, 2506–2508.
Highlighted as 'recommended' by Faculty of 1000 Biology.
- [43] Young, D. D.; Lusic, H.; Lively, M. O.; Deiters, A. "Restriction Enzyme-Free Mutagenesis via the Light Regulation of DNA Polymerization", *Nucl. Acids Res.* **2009**, *37*, e58.
Highlighted as 'recommended' by Faculty of 1000 Biology.
- [42] Young, D. D.; Garner, R. A.; Yoder, J. A.; Deiters, A. "Light Activation of Gene Function in Mammalian Cells via Ribozymes", *Chem. Commun.* **2009**, 568-570.
- [41] Young, D. D.; Lusic, H.; Lively, M. O.; Yoder, J. A.; Deiters, A. "Gene Silencing in Mammalian Cells with Light-Activated Antisense Agents", *ChemBioChem* **2008**, *9*, 2937-2940.
- [40] Zou, Y.; Young, D. D.; Cruz, A.; Deiters, A. "Synthesis of Anthracene and Azaanthracene Fluorophores via [2+2+2] Cyclootrimerization Reactions", *Org. Lett.* **2008**, *10*, 4661-4664.
- [39] Young, D. D.; Torres-Kolbus, J.; Deiters, A. "Microwave-Assisted Synthesis of Unnatural Amino Acids", *Bioorg. Med. Chem. Lett.* **2008**, *18*, 5478-5480.
- [38] Lusic, H.; Estella M. Gustilo, Vendeix, F.; Kaiser, R.; Delaney, M. O.; Graham, W. D.; Moye, V. A.; Cantara, W. A.; Agris, P. F.; Deiters, A. "Synthesis and investigation of the 5-formylcytidine modified, anticodon stem and loop of the human mitochondrial tRNA^{Met}", *Nucl. Acids Res.* **2008**, *36*, 6548-6557.
- [37] McIver, A.; Young, D. D.; Deiters, A. "A General Approach to Triphenylenes and Azatriphenylenes: Total Synthesis of Dehydrotylophorine and Tylophorine", *Chem. Commun.* **2008**, 4750-4752.
- [36] Gumireddy, K.; Young, D. D.; Xiong, X.; Hogenesch, J. B.; Huang, Q.; Deiters, A. "Small Molecule Inhibitors of MicroRNA miR-21", *Angew. Chem. Int. Ed.* **2008**, *47*, 7482-7484.
Highlighted as a 'Hot Paper' by Angewandte Chemie.
- [35] Young, D. D.; Nichols, J.; Kelly, R. M.; Deiters, A. "Microwave Activation of Enzymatic Catalysis", *J. Am. Chem. Soc.* **2008**, *130*, 10048-10049.
Highlighted in Nature **2008**, *454*, 257. *Highlighted as 'exceptional' by Faculty of 1000 Biology.*
- [34] Teske, J.; Deiters, A. "A Cyclootrimerization Route to Cannabinoids", *Org. Lett.* **2008**, *10*, 2195-2198.
- [33] Lusic, H.; Lively, M. O.; Deiters, A. "Light-Activated Deoxyguanosine: Photochemical Regulation of Peroxidase Activity", *Mol. BioSys.* **2008**, *4*, 508-511.
Invited contribution for a special issue.
- [32] Young, D. D.; Deiters, A. "Light-regulated RNA–Small Molecule Interactions", *ChemBioChem* **2008**, *9*, 1225-1228.
- [31] Sripada, L.; Teske, J. A.; Deiters, A. "Phenanthridine Synthesis via [2+2+2] Cyclootrimerization Reactions", *Org. Biomol. Chem.* **2008**, 263-265.
- [30] Young, D. D.; Edwards, W. F.; Lusic, H.; Lively, M. O.; Deiters, A. "Light-Triggered Polymerase Chain Reaction", *Chem. Commun.* **2008**, 462-464.
Highlighted in Chemical Biology **2008**, *3*, B11.
- [29] Teske, J. A.; Deiters, A. "Microwave-mediated Nickel-catalyzed Cyclootrimerization Reactions: Total Synthesis of Illudinine", *J. Org. Chem.* **2008**, *73*, 342-345.
- [28] Senaiar, R. S.; Teske, J. A.; Young, D. D.; Deiters, A. "Synthesis of Indanones via Solid-Supported [2+2+2] Cyclootrimerization", *J. Org. Chem.* **2007**, *72*, 7801-7804.
- [27] Young, D. D.; Sripada, L.; Deiters, A. "Microwave-Assisted Solid-Supported Alkyne Cyclootrimerization Reactions for Combinatorial Chemistry", *J. Comb. Chem.* **2007**, *9*, 735-738.
- [26] Young, D. D.; Deiters, A. "Photochemical Activation of Protein Expression in Bacterial Cells", *Angew. Chem. Int. Ed.* **2007**, *46*, 5187-5190.
- [25] Young, D. D.; Deiters, A. "A General Approach to Chemo- and Regioselective Cyclootrimerization Reactions", *Angew. Chem. Int. Ed.* **2007**, *46*, 5187-5190.
- [24] Lusic, H.; Young, D. D.; Lively, M. O.; Deiters, A. "Photochemical DNA Activation", *Org. Lett.* **2007**, *9*, 1903-1906.
- [23] Young, D. D.; Deiters, A. "Photochemical Control of Biological Processes", *Org. Biomol. Chem.* **2007**, *5*, 999-1005.
Invited contribution for an emerging area report.

- [22] Deiters, A.; Yoder, J. "Conditional Transgene and Gene Targeting Methodologies in Zebrafish", *Zebrafish* **2006**, *3*, 415-429.
- [21] Lusic, H.; Deiters, A. "A New Photocaging Group for Aromatic *N*-Heterocycles", *Synthesis* **2006**, 2147-2150.
Invited contribution for a special issue.
- [20] Young, D. D.; Senaiar, R. S.; Deiters, A. "Solid-Supported [2+2+2] Cycloadditions", *Chem. Eur. J.* **2006**, *12*, 5563-5568.
- [19] Young, D. D.; Deiters, A. "Photochemical Activation of a Hammerhead Ribozyme", *Bioorg. Med. Chem. Lett.* **2006**, *16*, 2658-2661.
Top 25 Bioorg. Med. Chem. Lett. most downloaded articles in 2006.
- [18] Senaiar, R. S.; Young, D. D.; Deiters, A. "Pyridines via Solid-Supported [2+2+2] Cycloadditions", *Chem. Commun.* **2006**, 1313-1315.
- [17*] Deiters, A.; Petterson, M.; Martin, S. F. "General Strategy for the Syntheses of Corynanthe, Tacaman, and Oxindole Alkaloids", *J. Org. Chem.* **2006**, *71*, 6547-6561.
- [16*] Deiters, A.; Groff, D.; Xie, J.; Schultz, P. G. "A Genetically Encoded Photocaged Tyrosine", *Angew. Chem. Int. Ed.* **2006**, *45*, 2728-2731.
Highlighted as a 'Very Important Paper' by Angewandte Chemie.
- [15*] Summerer, D.; Chen, S.; Wu, N.; Deiters, A.; Chin, J. W.; Schultz, P. G. "A Genetically Encoded, Fluorescent Amino Acid", *Proc. Nat. Acad. Sci.* **2006**, *103*, 9785-9789.
Highlighted in the NCSU News Release (6/27/2006) and the NCSU Technician (7/06/2006).
- [14*] Deiters, A.; Schultz, P. G. "In Vivo Incorporation of an Alkyne into Proteins in *E. coli*", *Bioorg. Med. Chem. Lett.* **2005**, *15*, 1521-1524.
- [13*] Deiters, A.; Geierstanger, B.; Schultz, P. G. "Site-specific In Vivo Labeling of Proteins for NMR Studies", *ChemBioChem* **2004**, *5*, 55-58.
- [12*] Deiters, A.; Cropp, T. A.; Summerer, D.; Mukherji, M.; Schultz, P. G. "Site-Specific PEGylation of Therapeutic Proteins Containing Unnatural Amino Acids", *Bioorg. Med. Chem. Lett.* **2004**, *14*, 5743-5745.
- [11*] Wu, N.; Deiters, A.; Cropp, A.; King, D.; Schultz, P. G. "A Genetically Encoded Photocaged Amino Acid", *J. Am. Chem. Soc.* **2004**, *126*, 14306-14307.
- [10*] Deiters, A.; Martin, S. F. "Ring-Closing Metathesis Reactions in the Synthesis of Heterocycles", *Chem. Rev.* **2004**, *104*, 2199-2238.
Highlighted as a 'Fast Breaking Paper' by THOMSON-ISI in April 2005.
- [9*] Deiters, A.; Cropp, T. A.; Mukherji, M.; Chin, J. W.; Anderson, J. C.; Schultz, P. G. "Adding Amino Acids with Novel Reactivity to the Genetic Code of *Saccharomyces Cerevisiae*", *J. Am. Chem. Soc.* **2003**, *125*, 11782-11783.
- [8*] Deiters, A.; Chen, K.; Eary, T.; Martin, S. F. "Biomimetic Synthesis of the Sarpagan Skeleton – Total Synthesis of the Indole Alkaloids (+)-Geissoschizine and (+)-*N*-Methylvellosimine", *J. Am. Chem. Soc.* **2003**, *125*, 4541-4550.
- [7*] Deiters, A.; Martin, S. F., "Stereoselective Total Synthesis of Dihydrocorynantheol", *Org. Lett.* **2002**, *4*, 3243-3245.
- [6*] Deiters, A.; Mück-Lichtenfeld, C.; Fröhlich, R.; Hoppe, D. "Planar-Chiral (2*E*,7*Z*)- and (2*Z*,7*E*)-Cyclonona-2,7-dien-1-yl Carbamates by Asymmetric, Bis-Allylic α,α' -Cycloalkylation - Studies on Their Conformational Stability", *Chem. Eur. J.* **2002**, *8*, 1833-1842.
- [5*] Deiters, A.; Hoppe, D. "Asymmetric Synthesis of *cis*-1,2-Dialkenyl-Substituted Cyclopentanes via (–)-Sparteine-Mediated Lithiation and Cycloalkylation of a 9-Chloro-2,7-nonadienyl Carbamate", *J. Org. Chem.* **2001**, *66*, 2842-2849.
- [4*] Deiters, A.; Wibbeling, B.; Hoppe, D. "Enantio- and Diastereoselective Synthesis of a 3,4-Divinylpyrrolidine via Asymmetric Deprotonation and Cyclization of a 9-Chloro-5-aza-2,7-nonadiene", *Adv. Synth. Catal.* **2001**, *1*, 181-183.
- [3*] Deiters, A.; Fröhlich, R.; Hoppe, D. "Enantioselective Synthesis of Functionalized 1,5-Cyclononadienes by Intramolecular Cycloalkylation by Means of a Diallylcoupling", *Angew. Chem. Int. Ed.* **2000**, *39*, 2105-2107.
- [2*] Deiters, A.; Mück-Lichtenfeld, C.; Fröhlich, R.; Hoppe, D. "Asymmetric Synthesis of a (2*Z*,7*E*)-Cyclononadiene by an Intramolecular Cycloalkylation and Insight to Its Conformational Properties", *Org. Lett.* **2000**, *2*, 2415-2418.
- [1*] Deiters, A.; Hoppe, D. "Chiral Induction by Elimination-Coupled Lithium-Ene Reaction: Synthesis of (+)-(3*R*,4*R*)-1,2-Dihydromultifidene", *Angew. Chem. Int. Ed.* **1999**, *38*, 546-548.

Memberships

Sigma Xi (since 2007)

Center for Comparative Medicine and Translational Research at North Carolina State University (since 2007)

Triangle Zebrafish Group (since 2005)

RNA Society of North Carolina (since 2005)

American Chemical Society (since 2005)

North Carolina State University Biotechnology Faculty (since 2004)

North Carolina State University RNA Biology Group (since 2004)

German Chemical Society (since 1997)

Deiters Lab in the News

"The Effect of Microwave Irradiation on DNA Hybridization" highlighted by the Faculty of 1000 Biology and rated as Recommended (F1000 Factor 3.0), June 11, **2009**.

"Restriction Enzyme-Free Mutagenesis via the Light Regulation of DNA Polymerization" highlighted by the Faculty of 1000 Biology and rated as Recommended (F1000 Factor 3.0), May 14, **2009**.

"NC State Chemist Receives NSF Career Award", NCSU News Release, January 30, **2009**.

"PAMS Chemist Discovers Molecules that Inhibit Important Gene Regulators", Scope Magazine, Winter **2009**.

"NC State Researcher Discovers Molecules That Inhibit Important Gene Regulators", NCSU News Release, September 24, **2008**.

"Wistar, NCSU Scientists Develop Cell Assay to Screen for miRNA Inhibitors" by LoBuono, C. *Genome Web*, October 3, **2008**.

"Researcher Discovers Inhibitor of Gene Regulator", *Innovations Report*, September 26, **2008**.

"When Inhibitors Become Inhibited: miR-21 Becomes the Prey", *EpiGenie*, September 26, **2008**.

"Cure for Cancer", *Scientific Weekly*, September 25, **2008**.

"Scientists identify novel inhibitor of human microRNA", *e!Science News*, September 25, **2008**.

"Stopping Cancer Cells Before They Start? Inhibitor Of Gene Regulator Discovered", *ScienceDaily*, September 25, **2008**.

"Microwave activation of enzymatic catalysis" highlighted by the Faculty of 1000 Biology and rated as Exceptional (F1000 Factor 9.0), September 9, **2008**.

"Use microwaves to activate enzymatic catalysis" in *Noteworthy Chemistry*, American Chemical Society, September 8, **2008**.

"Biochemistry: Cook the catalyst" in *Nature* **2008**, 454, 257.

"Microwave Pfu CelB 5 minutes for highest activity" in *Research Blogging*, July 14, **2008**.

"Discovery Could Help to Treat Cancer", NC State Alumni Magazine, Lab Notes, Winter **2008**.

"NC State Researchers Discover Novel Method for Activating Enzymatic Reactions", NCSU News Release, July 21, **2008**.

"Researchers Create Chemical 'Light Switches' to Aid Study of Gene Function", under Groundbreaking Research in NCSU Year 2007 in Review, January **2008**.

"Synthesis of Cannabinoids" by Kocienski, P.; Dager, I. *Synfacts* **2008**, 12, 1250.

"A Microwave-assisted Cyclotrimerization Route to Phenanthridines" by Snieckus, V.; Patel, J.J. *Synfacts* **2008**, 4, 347.

"Scientists Create Genetic Light Switches", Scope Magazine, Fall **2007**.

"PCR Light Switch", *Chemical Biology* **2008**, 3, B11.

"Cottrell and Beckman Awards for A. Deiters", *Angew. Chem. Int. Ed.* **2007**, 46, 6400.

"Researchers Create Chemical 'Light Switches' to Aid Study of Gene Function", NCSU News Release, August 8, **2007**.

"Shining New Light on Proteins", NC State Alumni Magazine, Lab Notes, Fall **2006**.

"Researchers Create Genetically Coded Fluorescent Amino Acid, Lighting the Way to Study Proteins", NCSU News Release, June 27, **2006**.

"Breaking the Codes - Professor Alex Deiters is using organic chemistry to manipulate proteins and genes", NCSU Technician, July 6, **2006**.

Current Grants

Deiters (PI) 9/01/2009-08/31/2012

Small Molecules as new Probes and Therapeutics for Liver Diseases

American Chemical Society – Teva USA Scholar Grant

Deiters (Co-PI) 06/01/2009-05/31/2012

Near-Natural Amino Acid Mutagenesis for the Study of Protein function

National Science Foundation

Deiters (PI) 06/01/2009-05/31/2014

CAREER: Solid-Supported Cyclotrimerizations - A Library Approach to Research and Teaching

National Science Foundation

Agris (PI)/Deiters (Co-PI) 1/01/2009-12/31/2010

Novel Peptide Intervention Targets a Critical Host-Retrovirus Molecular Interaction

NC Biotech Center

Deiters (PI) 09/01/2007-08/31/2010

Photochemical Genomics: Controlling Genes with Light

Arnold & Mabel Beckman Foundation – Beckman Young Investigator Award

Deiters (PI) 07/01/2007-06/30/2010

A Library Approach to Cellular Light Receptors

Research Corporation – Cottrell Scholar Award

Deiters (PI)/Yoder (Co-PI) 1R01GM79114 07/01/2007-06/30/2012

Switchable Systems for Spatio-Temporal Control of Gene Expression in Zebrafish

National Institutes of Health