

# MICHAEL H. HECHT, PH.D.

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## EDUCATION

CORNELL UNIVERSITY, B. A. *Summa cum laude* in Chemistry 1977

Mentor: Prof. Harold A. Scheraga

Thesis: Studies of the  $\alpha$ -helical Propensities of Amino Acids in Synthetic Copolymers.

MIT, Department of Biology, Ph.D. 1984

Mentor: Prof. Robert T. Sauer:

Thesis: The Effect of Amino Acid Replacement on the Structure and Stability of the N-terminal Domain of  $\lambda$ -Repressor

## POST-DOCTORAL

DUKE UNIVERSITY, Department of Biochemistry 1986–1989

Mentors: Professors David and Jane Richardson

Research: Design of Novel Proteins.

## FACULTY POSITIONS

PRINCETON UNIVERSITY - Department of Chemistry	- Assistant Professor	1990–1996
	- Associate Professor	1996–2003
	- Professor	2003–
	- Associate Chair of Department	2004–2007
	- Director of Undergraduate Studies	2001–2008
PRINCETON UNIVERSITY – Forbes College	- Master, Head of Forbes College	2010–

## HONORS AND AWARDS

- College Scholar, CORNELL UNIVERSITY 1973–1977
- *Summa cum laude* with honors in Chemistry, CORNELL UNIVERSITY 1977
- National Science Foundation Graduate Fellow 1979–1983
- Life Sciences Research Foundation Burroughs-Wellcome Post-doctoral Fellow 1986–1989
- Whitaker Foundation Young Investigator Fellowship 1992
- Beckman Young Investigator Award 1993
- Protein Society - Kaiser Award 2003

## RESEARCH INTERESTS

- Synthetic Biology: Artificial proteomes and genomes
- *De novo* protein design
- Origin of life
- Protein folding and stability
- Combinatorial methods
- Amyloid, protein misfolding and aggregation
- Alzheimer's disease

## SERVICE – CHEMISTRY DEPARTMENT & PRINCETON UNIVERSITY

- Faculty Advisor for Undergraduates, Forbes College 1992-2010
- Council of the Princeton University Community (& Executive Committee) 2002-2005
- Faculty Advisory Committee on Policy 2002-2005
- McGraw Center for Teaching and Learning, Advisory Committee 2003-2006
- Director of Undergraduate Studies, Department of Chemistry 2001-2008
- Associate Chair, Department of Chemistry 2004-2007
- University Council on Science & Technology 2005-2008
- Institutional Biosafety Committee 2008-2009
- Executive Committee, Program in Quantitative and Computational Biology 2006-2014
- Center for Jewish Life, Board of Directors 2011-2014
- Presidential Task Force on the Residential Colleges at Princeton 2014-2015
- Task Force Subcommittee on Community Engagement, Chair 2014-2015
- Master of Forbes College 2010-

## SERVICE – SCIENTIFIC COMMUNITY

- Co-Organizer of Biannual Conference in Crete on Self-Assembling Peptides in Biology, Medicine & Engineering 1999, 2001, 2003, 2005, 2007
- Organizer of Conference in Jerusalem on Protein Design 2005
- Science & Technology Steering Committee, Brookhaven National Laboratory 2000-2005
- Editorial Advisory Board – *Protein Science* 2003-
- Editorial Advisory Board – *Protein Engineering, Design & Selection* 2003-
- Editorial Advisory Board – *Biopolymers* 2006-
- Biopolymers Gordon Conference Associate Chair (2008)  
Chair (2010)  
2014
- Organized NSF Workshop on the Future of Protein Engineering & Design 2014

## TRAINING OF STUDENTS

### POST DOCTORAL RESEARCHERS

- Joel Ybe 1991-1995
- James Beaseley 1995-1997
- Tun Liu 1997-1999
- Christine Wurth 2000-2002
- Peter Thumfort 2001-2005
- Luke Bradley 2001-2006
- Michael Ackerman 2003-2005
- Ryoichi Arai 2006-2007
- Izhack Cherny 2007-2011
- Betsy Smith 2010-2014
- Sarangan Chari 2010- (*Visiting scientist / Departmental guest*)
- Grant Murphy 2012-2016
- Shlomo Zharzitsky 2015-

### GRADUATE STUDENTS

- Huayu Xiong Chemistry Ph.D 1995
- Satwik Kamtekar Chemistry Ph.D 1995
- Adam Brunet Chemistry Ph.D 1996

• Brian Johnson	Chemistry	Ph.D	1996
• Michael West	Chemistry	Ph.D	1996
• Felicia Messing	Molecular Biology	M.S	1996
• Nina Rojas	Chemistry	Ph.D	1997
• Sushmita Roy	Chemistry	Ph.D	1998
• Maria Nedwidek	Molecular Biology	Ph.D	1999
• Weixun Wang	Chemistry	Ph.D	2001
• Dave Moffet	Chemistry	Ph.D	2002
• Yinan Wei	Chemistry	Ph.D.	2003
• Aditi Das	Chemistry	Ph.D.	2005
• Emily Breneman	Chemistry	M.S	2005
• Woojin Kim	Chemistry	Ph.D.	2006
• Abi Go	Chemistry	Ph.D.	2008
• Shona Patel	Chemical Engineering	Ph.D.	2008
• Jermont Chen	Chemistry	Ph.D.	2008
• Michael Fisher	Molecular Biology	Ph.D.	2009
• Angela Fortner	Chemistry	Ph.D.	2011
• Siyi Wang	Chemistry	M.S	2012
• Maria Korolev	Chemistry	Ph.D.	2013
• Nettie Pyne	Molecular Biology	M.S	2014
• Ann Mularz	Chemistry	Current	
• Katie Digianantonio	Chemistry	Current	
• Kenric Hoegler	Molecular Biology	Current	
• Scott Mellon	Molecular Biology	Current	
• Christina Karas	Molecular Biology	Current	

#### UNDERGRADUATE (SENIOR THESIS) STUDENTS

• Robert Weltman	Chemistry	AB	1991
• Laura Lanier	Chemistry	AB	1991
• Jarad Schiffer	Molecular Biology	AB	1991
• Aaron Cypess	Chemistry	AB	1992
• Enoch Huang	Molecular Biology	AB	1992
• Rodgers Palmer	Molecular Biology	AB	1992
• Alexandra Van Geel	Molecular Biology	AB	1993
• Jonathan Loeb	Molecular Biology	AB	1993
• Mary Elizabeth Huffine	Molecular Biology	AB	1994
• Eugene Kim	Chemistry	AB	1994
• Jennifer Babik	Molecular Biology	AB	1995
• Frank Raia	Chemistry	AB	1995
• Kate Wesseling	Chemistry	AB	1995
• Cyrena Torrey Simons	Chemistry	AB	1996
• Jeremy Mclean	Molecular Biology	AB	1997
• Kim Helmer	Chemistry	AB	1997
• Adam Kessel	Chemistry	AB	1998
• Jennifer Patterson	Chemical Engineering	BSE	1998
• Dan Rosenbaum	Chemistry	AB	1999
• Bede Broome	Chemistry	AB	1999
• Allison Smith	Chemistry	AB	1999
• Joe Mancias	Chemistry	AB	2000
• Laura Certain	Chemistry	AB	2000
• Christina Brown	Chemistry	AB	2001

• Steve Sazinsky	Chemistry	AB	2001
• Jennifer Foley	Molecular Biology	AB	2001
• Nathalie Guimard	Chemistry	AB	2001
• Emily Hung	Chemistry	AB	2002
• Jeff Clough	Molecular Biology	AB	2002
• Diana Lee	Chemistry	AB	2003
• Dominic Notario	Chemistry	AB	2003
• Jonathan Goldwasser	Chemistry	AB	2004
• Jonathan Chou	Molecular Biology	AB	2004
• Ralph Kleiner	Chemistry	AB	2005
• Christine Henry	Chemistry	AB	2005
• Danielle Shin	Molecular Biology	AB	2005
• Anna Wang	Chemistry	AB	2006
• Jesse Platt	Chemistry	AB	2007
• Ellen Duncan	Chemistry	AB	2007
• Debbie Chen	Molecular Biology	AB	2007
• Sayuri Jinadasa	Chemistry	AB	2008
• Anne Armstrong	Chemistry	AB	2008
• Sara Viola	Molecular Biology	AB	2008
• Steve Sasson	Chemistry	AB	2009
• Sam Leachman	Chemistry	AB	2009
• Beverly Hon	Molecular Biology	AB	2009
• Jessica Langholtz	Chemistry	AB	2009
• Atrish Bagchi	Chemistry	AB	2010
• Kara McKinley	Molecular Biology	AB	2010
• David Canner	Chemistry	AB	2011
• Dan Echelman	Chemistry	AB	2011
• Charlotte Rajasingh	Chemistry	AB	2011
• Roselyn Kellen	Molecular Biology	AB	2011
• Maria Aristova	Chemical Engineering	BSE	2012
• Laura Bock	Molecular Biology	AB	2012
• Richard Hildreth	Chemistry	AB	2013
• Jack Greisman	Molecular Biology	AB	2014
• Eliza Hompe	Chemistry	AB	2014
• Kelly Ivins-O'Keefe	Chemistry	AB	2014
• Harry Cape	Chemistry	Class of 2015	
• Alankrita Raghavan	Molecular Biology	Class of 2015	
• James Agolia	Chemistry	Class of 2016	
• Bennett McIntosh	Chemistry	Class of 2016	
• Matthew Volpe	Chem. & Biol. Engin.	Class of 2016	
• Taylor Myers	Chemistry	Class of 2017	
• Elizabeth Stanley	Chem. & Biol. Engin.	Class of 2018	

## MICHAEL H. HECHT, PH.D. – PUBLICATIONS

- Hecht MH, Zweifel BO & Scheraga HA (1978) Helix-Coil Stability Constants for the Naturally Occurring Amino Acids in Water: XVII Threonine Parameters from Poly (hydroxybutyl-glutamine-co-L-threonine). *Macromolecules* 11, 545-551.
- Hecht MH, Nelson HCM & Sauer RT (1983) Mutations in  $\lambda$ -Repressor's Amino-Terminal Domain: Implications for Protein Stability and DNA Binding. *Proc. Natl. Acad. Sci. (USA)* 80, 2676-2680.
- Nelson HCM, Hecht MH & Sauer RT (1983) Mutations Defining the Operator-Binding Sites of Bacteriophage  $\lambda$  Repressor. *Cold Spring Harbor Symp. on Quant. Biology* 47, 441-449.
- Sauer RT, Nelson HCM, Hehir K, Hecht MH, Gimble FS, DeAnda J, & Poteete AR (1983) The  $\lambda$  and P22 Phage Repressors. *J. Biomolec. Struct. and Dynam.* 1, 1011-1022.
- Hecht MH, Sturtevant JM, & Sauer RT (1984) Effect of Single Amino Acid Replacements on the Thermal Stability of the Amino Terminal Domain of Phage  $\lambda$ -Repressor. *Proc. Natl. Acad. Sci. (USA)* 81, 5685-5689.
- Hecht MH & Sauer RT (1985)  $\lambda$  Repressor Revertants: Amino Acid Replacements that Restore Activity to Mutant Proteins. *J. Molec. Bio* 186, 53-63.
- Hecht MH, Hehir K, Nelson HCM, Sturtevant JM & Sauer RT (1985) Increasing and Decreasing Protein Stability: Effects of Revertant Substitutions on the Thermal Denaturation of Phage  $\lambda$ -Repressor. *J. Cell. Biochem.* 29, 217-224.
- Hecht MH, Sturtevant JM & Sauer RT (1986) Stabilization of  $\lambda$  Repressor Against Thermal Denaturation by Site-Directed Gly $\rightarrow$ Ala Changes in  $\alpha$ -Helix 3. *Proteins: Structure, Function, and Genetics* 1, 43-46.
- Sauer RT, Nelson HCM, Hecht MH & Pakula A (1987) Identifying the Determinants of Protein Structure and Stability. pp. 177-198 in *New Frontiers in the Study of Gene Function* (G. Poste and S. Crooke, eds.) Plenum Press, New York.
- Hecht MH, Richardson DC, Richardson JS & Ogden R (1989) Design, Expression, and Preliminary Characterization of FELIX: A Model Protein. *J. Cell. Biochem.* (abstract) 13A, 86
- McClain RD, Danials SB, Williams RW, Pardi A, Hecht MH, Richardson JS, Richardson DC & Erickson BW (1990) Protein Engineering of Betabellins 9, 10, and 11. pp. 682-684 in *Peptides: Chemistry, Structure, and Biology* (J. E. Rivier and G. R. Mardhall, eds.) ESCOM Science Publishers, Leiden, The Netherlands.
- Hecht MH, Richardson JS, Richardson DC & Ogden RC (1990) *De Novo* Design, Expression, and Characterization of Felix: A Four-Helix Bundle Protein of Native-Like Sequence. *Science* 249, 884-891.
- Richardson JS, Richardson DC, Tweedy NB, Gernert KM, Quinn TP, Hecht MH, Erickson BW, Yan Y, McClain RD, Donlan ME & Surles MC (1992) Looking at Proteins: Representations, Folding, Packing, and Design. *Biophysical Journal* 63, 1186-1209.
- Brunet AP, Huang ES, Huffine ME, Loeb JE, Weltman RJ & Hecht MH (1993) The Role of Turns in Dictating the Structure of an  $\alpha$ -Helical Protein. *Nature* 364, 355-358.
- Kamtekar S, Schiffer JM, Xiong H, Babik JM & Hecht MH (1993) Protein Design by Binary Patterning of Polar and Non-Polar Amino Acids. *Science* 262, 1680-1685.
- Ybe JA & Hecht MH (1994) Periplasmic Fractionation of *Escherichia Coli* Yields Recombinant Plastocyanin Despite the Absence of a Signal Sequence. *Protein Expression and Purification* 5, 317-323.
- Hecht MH (1994) *De Novo* Design of  $\beta$ -Sheet Proteins (Commentary). *Proc. Natl. Acad. Sci. (USA)* 91, 8729-8730.
- Johnson BH & Hecht MH (1994) Recombinant Proteins Can Be Released From *E. Coli* Cells By Repeated Cycles of Freezing and Thawing. *Biotechnology* 12, 1357-1360.

- Xiong H, Buckwalter BL, Shieh HM & Hecht MH (1995) Periodicity of Polar and Non-Polar Amino Acids is the Major Determinant of Secondary Structure in Self-Assembling Oligomeric Peptides. *Proc. Natl. Acad. Sci. (USA)* 92, 6349-6353.
- Qiu D, Dong S, Ybe JA, Hecht MH & Spiro TG (1995) Variations in the Type I Copper Protein Coordination Group: Resonance Raman Spectrum of <sup>34</sup>S, <sup>65</sup>Cu, and <sup>15</sup>N-Labeled Plastocyanin. *J. Am. Chem. Soc.* 117, 6443-6446.
- Kamtekar S & Hecht MH (1995) 4-Helix Bundles: What Determines a Fold? *FASEB Journal* 9, 1013-1022.
- West MW & Hecht MH (1995) Binary Patterning of Polar and Nonpolar Amino Acids in the Sequences and Structures of Native Proteins. *Protein Science* 4, 2032-2039.
- Ybe JA & Hecht MH (1996) Sequence Replacements in the Central  $\beta$ -Turn of Plastocyanin. *Protein Science* 5, 814-824.
- Hecht MH (1996) Strategies for the Design of Novel Proteins. pp. 1-50 in *Protein Engineering and Design* (P. R. Carey - ed.) Academic Press, New York.
- Beasley JR & Hecht MH (1997) Protein Design: The Choice of *De Novo* Sequences. *J. Biol. Chem.* 272, 2031-2034.
- Roy S, Helmer KJ & Hecht MH (1997) Detecting Native-like Properties in Combinatorial Libraries of *De Novo* Proteins. *Folding & Design* 2, 89-92.
- Roy S, Ratnaswamy G, Boice JA, Fairman R, McLendon G & Hecht MH (1997) A Protein Designed by Binary Patterning of Polar and Nonpolar Amino Acids Displays Native-like Properties. *J. Am. Chem. Soc.* 119, 5302-5306.
- Nedwidek MN & Hecht MH (1997) Minimized Protein Structures: A Little Goes a Long Way (Commentary) *Proc. Natl. Acad. Sci. (USA)* 94, 10010-10011.
- Rojas NR, Kamtekar S, Simons CT, McLean JE, Vogel KM, Spiro TG, Farid RS & Hecht MH (1997) De Novo Heme Proteins From Designed Combinatorial Libraries. *Protein Science* 6, 2512-2524.
- Hecht MH, Hindsgaul O, & Kool ET (1998) Biopolymers - Editorial Overview. *Current Opinion in Chemical Biology* 2, 673-674.
- Dong S, Ybe JA, Hecht MH, & Spiro TG (1999) H-Bonding Maintains the Active Site of Type I Copper Proteins: Site-Directed Mutagenesis of Asn38 in Poplar Plastocyanin. *Biochemistry* 38, 3379-3385.
- Rosenbaum DM, Roy S, & Hecht MH (1999) Screening Combinatorial Libraries of De Novo Proteins By Hydrogen-Deuterium Exchange and Electrospray Mass Spectrometry. *J. Am. Chem. Soc.* 121, 9509-9513.
- West MW, Wang W, Patterson J, Mancias JD, Beasley JR & Hecht MH (1999) De Novo Amyloid Proteins From Designed Combinatorial Libraries. *Proc. Natl Acad. Sci.(USA)* 96, 11211-11216.
- Broome BM & Hecht MH (2000) Nature Disfavors Sequences of Alternating Polar and Nonpolar Amino Acids: Implications for Amyloidogenesis. *J. Molecular Biology* 296, 961-968.
- Roy S & Hecht MH (2000) Cooperative Thermal Denaturation of Proteins Designed by Binary Patterning of Polar and Nonpolar Amino Acids. *Biochemistry* 39, 4603-4607.
- Moffet DA, Certain LK, Smith AJ, Kessel AJ, Beckwith KA & Hecht MH (2000) Peroxidase Activity in Heme Proteins Derived From a Designed Combinatorial Library. *J. Am. Chem. Soc.* 122, 7612-7613.
- Moffet DA, Case MA, House JC, Vogel K, Williams R, Spiro TG, McLendon GL & Hecht MH (2001) Carbon Monoxide Binding by *De Novo* Heme Proteins From a Designed Combinatorial Library. *J. Am. Chem. Soc.* 123, 2109-2115.
- Xu, G, Wang W, Groves JT & Hecht MH (2001) Self-Assembled Monolayers from a Designed Combinatorial Library of *De Novo*  $\beta$ -sheet Proteins. *Proc. Natl Acad. Sci.(USA)* 98, 3652-3657.

- Hecht MH, West MW, Patterson J, Mancias JD, Beasley JR, Broome BM & Wang W. (2001) Designed Combinatorial Libraries of Novel Amyloid-like Proteins. Pages 127-138 in *Self-assembling Peptide Systems in Biology, Medicine and Engineering*, (Ed A. Aggeli, N. Boden, S Zhang) Kluwer Academic Publishers, Netherlands.
- Moffet DA & Hecht MH (2001) De Novo Proteins From Combinatorial Libraries. *Chemical Reviews* 101, 3191-3204
- Wang W, & Hecht MH (2002) Rationally Designed Mutations Convert De Novo Amyloid-Like Fibrils into Soluble Monomeric  $\beta$ -Sheet Proteins. *Proc. Natl Acad. Sci.(USA)* 99, 2760-2765.
- Wu Q, Li F, Wang W, Hecht MH & Spiro TG. (2002) UV Raman Monitoring of Histidine Protonation and H<sup>-2</sup>H Exchange in Plastocyanin. *J. Inorganic Biochem.* 88, 381-387.
- Wurth C, Guimard NK & Hecht MH. (2002) Mutations that Reduce Aggregation of the Alzheimer's A $\beta$ 42 Peptide: An Unbiased Search for the Sequence Determinants of A $\beta$  Amyloidogenesis. *J. Molec. Biology* 319, 1279-1290
- Brown CL, Aksay IA, Saville DA & Hecht MH (2002) Template-Directed Assembly of a *De Novo* Designed Protein. *J. Am. Chem. Soc.* 124, 6846-6848
- Wei Y, Liu T, Sazinsky SL, Moffet DA, Pelczer I & Hecht MH (2003) Stably Folded *De Novo* Proteins From a Designed Combinatorial Library. *Protein Science* 12, 92-102.
- Moffet DA, Foley J & Hecht MH (2003) Midpoint Reduction Potentials and Heme Binding Stoichiometries of *De Novo* Proteins from Designed Combinatorial Libraries. *Biophysical Chemistry* 105, 231-239.
- Wei Y, Fela D, Kim S, Hecht MH & Baum J. (2003) <sup>1</sup>H, <sup>13</sup>C and <sup>15</sup>N Resonance Assignments of S-824, a *De Novo* Four-Helix Bundle From a Designed Combinatorial Library. *J. Biomolecular NMR* 27, 395-396.
- Wei Y, Kim S, Fela D, Baum J & Hecht MH. (2003) Solution Structure of a *De Novo* Protein from a Designed Combinatorial Library. *Proc. Natl Acad. Sci.(USA)* 100, 13270-13273.
- Wei Y & Hecht MH. (2004) Enzyme-like Proteins from an Unselected Library of Designed Amino Acid Sequences. *Protein Engineering, Design & Selection (PEDS)* 17, 67-75.
- Hecht MH, Das A, Go A, Bradley LH & Wei Y (2004) *De Novo* Proteins from Designed Combinatorial Libraries. *Protein Science* 13, 1711-1723.
- Klepeis JL, Wei Y, Hecht MH & Floudas CA (2005) Ab initio Prediction of the Three-Dimensional Structure of a *De novo* Designed Protein: A Double Blind Case Study. *Proteins: Structure, Function and Bioinformatics* 58, 560-570.
- Bradley LH, Kleiner RE, Wang AF, Hecht MH & Wood DW (2005) An Intein-Based Genetic Selection Enables Construction of a High-Quality Library of Binary Patterned *De Novo* Sequences. *Protein Engineering, Design & Selection (PEDS)* 18, 201-207.
- Hu Y, Das A, Hecht MH & Scoles G (2005) Nanografting *De Novo* Proteins onto Gold Surfaces. *Langmuir* 21, 9103-9109.
- Kim W & Hecht MH (2005) Mutagenesis of the Carboxy-Terminal Residues of the Alzheimer's Peptide: Sequence Determinants of Enhanced Amyloidogenicity of A $\beta$ 42 Relative to A $\beta$ 40. *J. Biological Chemistry* 280, 35069-35076.
- Bradley LH, Thumfort P Hecht MH. (2006) *De Novo* Proteins from Binary Patterned Combinatorial Libraries. Chapter 3 in *Protein Design: Methods & Applications* in *Methods in Molecular Biology* (Humana Press) 340, 53-69.
- Wurth C, Kim W & Hecht MH (2006) Combinatorial Approaches to Probe the Sequence Determinants of Protein Aggregation and Amyloidogenesis *Protein and Peptide Letters* 13, 279-286.
- Bradley LH, Wei Y, Thumfort P, Wurth C Hecht MH. (2006) Protein Design by Binary Patterning of Polar and Nonpolar Amino Acids. Chapter 9 in *Protein Engineering Protocols* in *Methods in Molecular Biology* (Humana Press) 352, 155-166.
- Das A, Trammell SA & Hecht MH (2006) Electrochemical and Ligand Binding Studies of a *De Novo* Heme Protein. *Biophysical Chemistry* 123, 102-112.

- Kim W, Kim Y, Min J, Kim DJ, Chang Y-T & Hecht MH (2006) A High Throughput Screen for Compounds that Inhibit Aggregation of the Alzheimer's Peptide. *ACS Chemical Biology* 1, 461-469.
- Kim W & Hecht MH (2006) Generic Hydrophobic Residues are Sufficient to Promote Aggregation of the Alzheimer's A $\beta$ 42 Peptide. *Proc. Natl Acad. Sci.(USA)* 103, 15824-15829.
- Das A & Hecht MH (2007) Peroxidase Activity of *De Novo* Heme Proteins Immobilized on Electrodes. *J. Inorganic Biochemistry* 101, 1820-1826. DOI 10.1016/j.jinorgbio.2007.07.024
- Go A, Kim S, Hecht MH, & Baum J. (2007) NMR Assignments of S836: A De Novo Protein From a Designed Superfamily. *Biomolecular NMR Assignments* 1, 213-215. DOI 10.1007/s12104-007-9059-3
- Kim W & Hecht MH (2008) Mutations Enhance the Aggregation Propensity of the Alzheimer's A $\beta$  Peptide *J. Molec. Biology*. 377 565-574. DOI 10.1016/j.jmb.2007.12.079
- Go A, Kim S, & Baum J & Hecht MH (2008) Structure and Dynamics of *De novo* Proteins from a Designed Superfamily of 4-Helix Bundles *Protein Science* 17, 821-832. DOI:10.1110/ps.073377908
- Fisher MA, Patel SC, Cherny I & Hecht MH (2009) Knowledge Based Protein Design. in *Protein Engineering and Design* edited by S. Park & J. Cochran, Taylor and Francis Group, LLC., Boca Raton, FL, pp 237-254.
- Patel S, Bradley LH, Jinadasa S & Hecht MH. (2009) Cofactor Binding and Enzymatic Activity in an Unevolved Superfamily of *De Novo* Designed 4-Helix Bundle Proteins, *Protein Science* 18, 1388-1400. DOI: 10.1002/pro.147
- Chen J, Armstrong AH, Koehler AN & Hecht MH (2010) Small Molecule Microarrays Enable the Discovery of Compounds that Bind the Alzheimer's A $\beta$  Peptide and Reduce Cytotoxicity. *J. Am. Chem. Soc.* 132, 17015-17022. DOI 10.1021/ja107552s (Highlighted in Nature Chemistry doi:10.1038/nchem.954 - 26 November 2010)
- Olzscha H, Schermann SM, Woerner AC, Pinkert S, Hecht MH, Tartaglia GG, Vendruscolo M, Hayer-Hartl M, Hartl FU, Vabulas RM (2011) Amyloid-like Aggregates Sequester Numerous Metastable Proteins with Essential Cellular Functions. *Cell* 144, 67-78. DOI 10.1016/j.cell.2010.11.050
- Fisher MA, McKinley KL, Bradley LH, Viola SR & Hecht MH (2011) *De Novo* Designed Proteins From a Library of Artificial Sequences Function in *Escherichia Coli* and Enable Cell Growth. *PLoS ONE* 6(1): e15364. doi:10.1371/journal.pone.0015364
- Das A, Wei Y, Pelczer I & Hecht MH (2011) Binding of Small Molecules to Cavity Forming Mutants of a *De Novo* Designed Protein. *Protein Science* 20, 702-711. DOI: 10.1002/pro.601
- Smith BA & Hecht MH (2011) Functional *De Novo* Proteins (Review) *Current Opinion in Chemical Biology.*, 15, 421-426. DOI: 10.1016/j.cbpa.2011.03.006
- Armstrong AH, Chen J, Fortner-McKoy A & Hecht MH (2011) Mutations that replace aromatic side chains promote aggregation of the Alzheimer's A $\beta$  peptide. *Biochemistry* 50, 4058-4067. DOI: 10.1021/bi200268w
- Cherny I, Korolev M, Koehler AN & Hecht MH (2012) Proteins from an unevolved library of *de novo* designed sequences bind a range of small molecules. *ACS Synthetic Biology (Cover Article)* 1, 130-138. DOI: 10.1021/sb200018e
- Patel, SC & Hecht MH (2012) Directed Evolution of the Peroxidase Activity of a *De Novo* Designed Protein. *Protein Engineering, Design & Selection (PEDS) (Cover Article)* 25, 445-451. DOI: 10.1093/protein/gzs025
- Arai R, Kobayashi N, Kimura A, Sato T, Matsuo K, Wang AF, Platt JM, Bradley LH, & Hecht MH (2012) Domain-Swapped Dimeric Structure of a Stable and Functional *De Novo* 4-Helix Bundle protein, WA20. *J. Physical Chemistry B.* 116, 6789-6797. DOI: 10.1021/jp212438h
- Fortner-McKoy A, Chen J, Schupbach T & Hecht MH (2012) A Novel Inhibitor of Amyloid  $\beta$  (A $\beta$ ) Peptide Aggregation: From High Throughput Screening to Efficacy in an Animal Model of Alzheimer's Disease. *J. Biological Chemistry* 287, 38992-39000. DOI 10.1074/jbc.M112.348037



- McKoy AF, Chen J, Schupbach T & Hecht MH (2014) Structure-Activity Relationships for a Series of Compounds that Inhibit Aggregation of the Alzheimer's Peptide, A $\beta$ 42. *Chemical Biology & Drug Design*. **84**, 505-512  
DOI: [10.1111/cbdd.12341](https://doi.org/10.1111/cbdd.12341)
- Smith BA, Mularz AE, & Hecht MH (2015) Divergent Evolution of a Bifunctional *De Novo* Protein. *Protein Science* **24**, 246-252. DOI: [10.1002/pro.2611](https://doi.org/10.1002/pro.2611)
- Kobayashi N, Yasase K, Sato T, Hecht MH, Arai R (2015) Self-Assembling Nano-Architectures Created from a Protein Nano-Building Block Using Domain-Swapped Dimeric *De Novo* Protein. *J. Am. Chem. Soc.* **137**, 11285–11293. DOI: [10.1021/jacs.5b03593](https://doi.org/10.1021/jacs.5b03593) (*Cover of JACS*).
- Murphy GS, Greisman JB, Hecht MH (2015) *De Novo* Proteins with Life-Sustaining Functions are Structurally Dynamic. *J. Molec. Biology.* **428**, 399-411. <http://dx.doi.org/10.1016/j.jmb.2015.12.008>
- Hoegler KJ, Hecht MH (2016) A *De Novo* Protein Confers Copper Resistance in *Escherichia Coli*. *Protein Science*  
DOI: [10.1002/pro.2871](https://doi.org/10.1002/pro.2871)
- Digianantonio KM, Hecht MH (2016) A Protein Constructed *De Novo* Enables Cell Growth by Altering Gene Regulation *Proc. Natl Acad. Sci.(USA)* doi: [10.1073/pnas.1600566113](https://doi.org/10.1073/pnas.1600566113)
- Mularz-Donnelly AE, Murphy GS, Hecht MH (2016) A *De Novo* Enzyme That Sustains Life (*In Preparation*).
- Digianantonio KM, Korolev, M, Hecht MH (2016) A *De Novo* Protein Rescues the Deletion of a Key Enzyme in Central Metabolism by Up-Regulating an Endogenous and Promiscuous Alternative. (*In Preparation*).