

CONTACT INFORMATION

Alix Christine Deymier
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PERSONAL INFORMATION

Date of Birth: April 22nd, 1984

I was assigned female at birth and identify as female.

I was known as Alix Deymier-Black on all of my publications and presentations from 2010-2015

EDUCATION *(Include dates, majors, and details of degrees, training and certification)*

Bachelors of Science in Materials Science and Engineering

University of Arizona, Tucson, AZ · Aug 2002-May 2006 · Cumulative GPA: 3.9/4.0

- Obtained specialization certificates in Spectroscopy, Cultural materials, and Optical materials.
- Graduated with Honors and Alpha Cum Laude

Ph. D. in Materials Science and Engineering

Northwestern University, Evanston, IL · Aug 2006- Sept 2011 · Cumulative GPA: 3.9/4.0

- Thesis Topic: "Study of the elasto-plastic properties of mineralized biomaterials via synchrotron high-energy X-ray diffraction"
- Minors in Biology and Earth Sciences
- Dissertation advisor: Prof. David C. Dunand

Postdoctoral Study in the Department of Cell and Molecular Biology

Northwestern University, Chicago, IL, USA · Jan 2011-Apr 2012

- Studied the composition and structure of peritubular dentin and how it relates to the dentin mineralization.
- Postdoctoral Advisor: Prof. Arthur Veis (NU) with support from Prof. Stuart Stock (NU)
- I began this postdoc concurrently with my thesis preparation and defense at the request of Prof. Veis who required my assistance during this specific time frame.

Postdoctoral Study in the Department of Orthopedic Surgery

Columbia University, New York, NY and Washington University School of Medicine, St Louis, MO, USA · Jun 2012-Aug 2017

- Examining the structure-function relationships at the tendon-to-bone attachment
- Postdoctoral Advisor: Professor Stavros Thomopoulos
- The lab moved halfway through my postdoctoral training from Washington University to Columbia University.

EMPLOYMENT HISTORY *(List in chronological order, include position details and dates)*

Assistant professor in Biomedical Engineering in the School of Dental Medicine

UConn Health, Farmington, CT · Aug 2017-present

- Focus on combining materials science, chemistry, and biology to understand the multiscale quantitative effects of pathobiology on the musculoskeletal system.

PROFESSIONAL QUALIFICATIONS

- Completed the European training school "New Lights on Ancient Materials 2010" SOLEIL synchrotron, Saint-Aubin, France, May 27-June 2, 2010.

- Completed the “National School on X-ray and Neutron Scattering” Argonne National Laboratory, Argonne, IL Aug 12-25 2007.

PROFESSIONAL MEMBERSHIPS

- Member of the American Society of Mechanical Engineers since 2013
- Member of the American Dental Education Association since 2022

AWARDS & HONORS

- Nominee for the Osborn Award for Excellence in Biomedical Science Teaching

TEACHING ACTIVITIES (Past & Current)

I. SDM, SOM, SOE Undergraduate Teaching

• Instructor

- Instructor of BME/MSE 3700: Biomaterials at UConn Spring 2019-present (~80 undergraduate juniors and seniors per year)
 - Developed the “Case Study” Method for promoting Engineering Creativity

• Lecturer

- Lecturer of “The applications of Materials Science techniques to archaeological copper samples at Cahokia” in the “Freshman Seminar in Anthropology” course at Washington University in St Louis Spring 2012-2014.
- Lecturer of “Applications and techniques of X-ray Diffraction” in the “Earth Materials” course at Washington University in St. Louis Fall 2012.

II. SDM Resident Teaching

- Instructor of DENT/DERE 5432: Graduate Dental Materials at UConn Health Spring 2021 (~25 dental residency students)

III. Graduate School Courses

• Instructor

- Co-Instructor of the Biomedical Sciences Skeletal Biology and Regeneration Journal Club Jan 2023-present (~15 graduate students)
- Instructor and Creator of “Dance and Physics” an Independent Learning Opportunity in the UConn School of Dental Medicine and School of Medicine 2019-present (~10 medical and dental students)
- Instructor and Co-Creator of “Sex and Gender in Medicine” an Independent Learning Opportunity in the UConn School of Dental Medicine and School of Medicine 2018-2020 (~40 medical and dental students)
- Co-Instructor MEMS 5560: Interfaces and Attachments in Natural and Engineered Structures at Washington University with Prof. Guy Genin in the Fall 2015 (45 graduate students)

• Lecturer

- Lecturer of “Characterization of Skeletal Tissues” lecture in MEDS 6445: Skeletal Biology 2018-present

SERVICE ACTIVITIES (Past & Current)

I. Committee Memberships

A. Department Positions

- Member of Graduate Curriculum Committee Biomedical Engineering (2019-present)
- Member of the Biomedical Sciences Admissions Committee (2018-2021)
- Member of the Biomedical Engineering Admissions Committee (2018-present)

- Member of the Biomedical Engineering Diversity Equity and Inclusion (DEI) Committee (2019-present)
- Member of the BME Department Head Search Committee (2022-present)
- Creator and Inaugural Lead of the BME UCHC Monthly Lab Seminar (2020-2023)
- Creator and Inaugural Leader of the BME UCHC Summer Research Day (2012-2023)
- Member of the Graduate Thesis committee for:
 - Anupama Prabhathachandran (Laurencin, Ph.D. in BME 2021)
 - Meredith Emily (Sandell, Ph.D. in BMS 2021)
 - Leila Daneshmandi (Laurencin, Ph.D. in BME 2022)
 - Anusha Vaddi (Tadinada, Masters in Dentistry 2022)
 - Romoye Sohan (Caromile, Masters YIP 2023)
 - Pejman Ghelich (Tamayol, Ph.D. in BME 2023)
 - Adam Tanguay (Schmidt, Ph.D. in BMS 2023)
- B. SDM Positions, Committee Memberships
 - Dental School coach for first year dental students at UConn Health (2019-2021)
 - Member of the Faculty Evaluation Appeals Committee for the School of Dental Medicine (2019-2020)
 - Member of the Faculty Evaluation Executive Committee for the School of Dental Medicine (2020-2022)
- C. University Positions, Committee Memberships
 - Member of the Queer Science Team (2022-present)
 - Reviewer for the UConn Jorgensen Fellowship Committee (2021)
 - Reviewer for the UConn Harriot Fellowship Committee (2021)
 - Reviewer for the UConn Crandall Fellowship Committee (2021-present)
 - Society of Women Engineers UConn Board Member (2020-Present)
 - Faculty Sponsor for oSTEM (2018-present)
 - Group leader for the UConn Interprofessional Education Dean's Day (2018-present)
- D. Regional, National, International Positions
 - Co-Chair of the American Society of Mechanical Engineers Tissue and Cellular Engineering Technical Committee (2022-present)
 - American Society of Mechanical Engineers Theme co-chair for Tissue Engineering and Regeneration (2020-present)
 - American Society of Mechanical Engineers Theme chair for Mineralized Tissue Mechanics (2019-2023)
- II. Scientific Reviewing; Editorial; Advisory**
 - A. Study section, grant review panel memberships
 - NIH Reviewer for Skeletal Biology Development and Disease Study Section 2023
 - NSF Reviewer 2020, 2021, 2022
 - Reviewer for the European Research Council Materials Engineering Panel 2021
 - Reviewer for the Israel Science Foundation Special Programs 2021, 2023
 - B. Ad hoc journal reviewing
 - Reviewer for the following journals:
 - ACS Biomaterials Science & Engineering
 - ACS Earth and Space Chemistry
 - Acta Biomaterialia
 - Annals of Translational Medicine
 - Bone
 - Bone Reports
 - International Journal of Environmental Research and Public Health
 - Journal of Biomechanical Engineering

- Journal of Biomechanics
- Journal of Bone and Mineral Research
- Journal of Microscopy
- Journal of Musculoskeletal Disorders and Treatment
- Journal of Orthopaedic Research
- Journal of the Mechanical Behavior of Biomedical Materials
- Life
- Materials Today Communications
- Mineralogical Magazine
- Osteoarthritis and Cartilage
- Physiological Reports
- Regenerative Engineering and Translational Medicine
- Scientific Reports
- Spectroscopy Letters

PRESENTATIONS and PUBLICATIONS (in chronological order, earliest first)

I. Invited Addresses

- 1 A.C. Deymier. X-ray Studies of Bovine Teeth. Invited podium presentation at the Advanced Photon Source User Science Seminar Series, Argonne, IL. Feb 6, 2009.
- 2 A.C. Deymier-Black. Multiscale structure and mechanics of the tendon-to-bone insertion. Seminar Talk at the Avioli Musculoskeletal Seminar Series at Washington University in St Louis. St Louis, MO. May 23rd, 2014.
- 3 A.C. Deymier-Black. The First Award Fellowship and Cool Things it has Allowed Me to Do....Invited Podium Presentation at the Innovation by a New NSBRI Generation Workshop at the Human Research Project Investigator's Workshop. Galveston, TX. Jan 13-15, 2015.
- 4 A.C. Deymier. Multiscale structure and mechanics of the tendon-to-bone insertion. Seminar Talk at TU Wien Vienna, AT. June 27, 2015.
- 5 A.C. Deymier. Multiscale structure and mechanics of the tendon-to-bone insertion. Seminar Talk at the University of Cambridge, UK. Aug 3, 2015.
- 6 A.C. Deymier. Hierarchical Investigation of the Structure and Mechanics of the Tendon-to-Bone Attachment. Seminar Talk at the University of Birmingham, UK. June 15, 2016.
- 7 A.C. Deymier. The role of biomineral properties on structural tissue mechanics. Invited Talk at the University of Colorado, Boulder. Feb 5, 2016.
- 8 A.C. Deymier. Multiscale Structure and Mechanics of the Tendon-to- Bone Attachment. Seminar Talk at the Université Pierre et Marie Curie, France. Jan 26, 2017.
- 9 A.C. Deymier. Small Structures Big Effects: The Consequences of Unloading on the Tendon-to-Bone attachment. Invited Talk at the National Space Biomedical Research Institute Musculoskeletal Alterations Meeting. Feb 21, 2017
- 10 A.C. Deymier. Multiscale Structure-Function Relationships in Musculoskeletal Tissues. Seminar Talk at the NYC Bone Seminar, New York, NY. Feb 28, 2017.
- 11 A.C. Deymier. Small Structures Big Effects: Multiscale Structure-Function Relationships in Musculoskeletal Tissues. Seminar Talk at the UCHC Dental Dean's Seminar. Farmington, CT. Aug 11th, 2018.
- 12 A.C. Deymier. Small Structures Big Effects: Multiscale Structure-Function Relationships in Musculoskeletal Tissues. Invited Talk at the Center for Cell analysis and Modelling. Farmington, CT. April 12th, 2018.
- 13 A.C. Deymier. Small Structures Big Effects: Multiscale Structure-Function Relationships in Musculoskeletal Tissues. Invited Talk at the University of York. York, UK. Sept 20th, 2018.
- 14 A.C. Deymier. How am I not myself?. Invited Talk at Northwestern University in the Materials Science Alliance for an Inclusive Community Seminar. Evanston, IL. Nov 5th, 2018.

- 15 A.C. Deymier. But Wait There's More!: How Musculoskeletal Tissues Resist Failure. Invited Talk at Northwestern University Department of Materials Science. Evanston, IL. Nov 6th, 2018.
- 16 A.C. Deymier. Bye Bye Bye: How Diet And Exercise Affect Bone Loss. Invited Talk at The Forsyth Institute. Cambridge, MA. Dec 3rd, 2019.
- 17 A.C. Deymier. A mean ol' acid: Elucidating the effect of acidic physiological environments on skeletal tissues. Invited Talk for the MateriAlZ Seminar Series at UofA and ASU. Sept 3rd, 2021.
- 18 A.C. Deymier. Dental Apatite: The Great Deceiver. Invited talk for the Rutger's Dental Research Seminar Series. Nov 9th, 2021.
- 19 A.C. Deymier. I just want to watch you dissolve: the physiochemical response of bone to pH dysregulation. Invited talk for the Dept of Biomedical Engineering at Virginia Commonwealth University. Nov 8th, 2022.
- 20 L. Caromile, V. Scanlon, A.C. Deymier. Transitions Academy - Senior Graduate Session: Planning Your Next Step After Graduate School. Invited panel speaker at the American Society of Cell Biologist 2022 Meeting. Washington, D.C. Dec 4th, 2022.
- 21 A.C. Deymier. The Fabulous Adventures in Musculoskeletal Science of Alix Deymier. Invited talk for the Department of Physics at Colgate College. Dec 6th, 2022.
- 22 A.C. Deymier. Turtles all the way down: Using hierarchical approaches to elucidate the materials properties of hard tissues. Invited talk for the Department of Bioengineering at George Mason University. Jan 12th, 2023
- 23 A.C. Deymier. Turtles all the way down: Using hierarchical approaches to elucidate the materials properties of hard tissues. Invited talk for the Department of Materials Science and Engineering at the University of Central Florida. Feb 15th, 2023.
- 24 A.C. Deymier. Solution or Dissolution: Physiochemical and Cellular Responses to pH Dysregulation. Invited talk for the Center for Bone Biology at Vanderbilt University. March 27th, 2023.

II. Workshops, Clinics

- 1 L. Caromile, V. Scanlon, A.C. Deymier. Transitions Academy - Senior Graduate Session: Planning Your Next Step After Graduate School. Invited panel speaker at the American Society of Cell Biologist 2022 Meeting. Washington, D.C. Dec 4th, 2022.

III. Conference Presentations (bolded presentations are directly from the Deymier Lab)

- 1 Simmons-Potter K., B. Glebov, P. Vandiver, T. Moreno, A.C. Deymier. Laser Removal of Conservation Treatments. Poster presentation at the 2004 Fall MRS Meeting, Boston, MA. Nov 28-Dec 3, 2004.
- 2 Deymier, A.C, J.D. Almer, M.L. Young, D.R. Haeffner, D.C. Dunand. Determination of the Mechanical Properties of Bovine Dentin Using High Energy X-ray Diffraction. Poster presentation at the Argonne National Laboratory Users Week 2007, Argonne, IL. May 7-12, 2007.
- 3 Deymier, A.C., J.D. Almer, D.R. Haeffner, D.C. Dunand. High Energy X-ray Diffraction Measurement of Load Transfer between Hydroxyapatite and Collagen in Bovine Dentin. Podium Presentation at the 2009 MRS Spring Meeting, San Francisco, CA. April 13-17, 2009.
- 4 Chastain, M.L., D.C. Dunand, J.A. Brown, A.C. Deymier. Materials Science Analysis of Copper Artifacts from Cahokia's Mound 34. Podium Presentation at the Society for American Archaeology 75th Anniversary Meeting, St. Louis, MO. April 14-18, 2010.
- 5 Deymier-Black, A.C., A. Singhal, F. Yuan, J.D. Almer, D.C. Dunand. Creep Mechanism in Bone and Dentin via High energy X-ray Diffraction. Podium Presentation at the SEM 2010 Annual Conference & Exposition on Experimental & Applied Mechanics, Indianapolis, IN. June 7-10, 2010.
- 6 Deymier-Black, A.C., A. Singhal, F. Yuan, J. D. Almer, D. R. Haeffner, L. C. Brinson, D. C. Dunand. Probing Creep Mechanisms in Bone and Dentin by Synchrotron X-ray Diffraction.

- Poster presentation at the Biomineralization Gordon Conference 2010, New London, NH. August 15-20, 2010.
- 7 Deymier-Black, A.C. , A. Singhal, F. Yuan, J. D. Almer, L. C. Brinson, D. C. Dunand. Effects of X-Ray Irradiation on Load Partitioning Between the Constituent Phases of Cortical Bone. Poster presentation at the Bone Research Society/British Orthopaedic Research Society Joint Meeting, Cambridge, UK. June 27-29, 2011.
 - 8 Deymier-Black, A.C., F. Yuan, A. Singhal, J.D. Almer, L.C. Brinson, D.C. Dunand. The Effect of X-ray Irradiation on the Creep Behavior of Bovine Cortical Bone. Podium presentation at the Society of Engineering Science 2011 Annual Technical Conference, Evanston, IL. October 12-14, 2011.
 - 9 Deymier-Black, A.C., A. Veis, S.R. Stock, J.R. Dorvee, L. Gerkowicz. Investigation of the Structure of Peritubular Dentine via SEM and TOF-SIMS analysis. Poster presentation at the Biomineralization Gordon Conference 2012, New London, NH. August 12-17, 2012.
 - 1 Deymier-Black, A.C., A.G. Schwartz, Z. Cai, G.M. Genin, S. Thomopoulos. Mineral
0 morphology at the tendon-to-bone Interface observed via High Energy X-ray diffraction. Podium Presentation at the ASME 2013 Summer Bioengineering Conference, Sunriver, OR. June 26-29, 2013.
 - 1 Jenny Yizhong Hu, Alix C. Deymier-Black, Victor Birman, Stavros Thomopoulos, Guy M.
1 Genin. Rough interfaces to smooth rotator cuff repair. Paper NEMB2014-93006. Third ASME Global Congress on Nanoengineering in Medicine and Biology (NEMB2014), San Francisco, CA, February 2-5, 2014.
 - 1 Deymier-Black, A.C., Andrea Gitomer Schwartz, Zhonghou Cai, Guy M. Genin, Stavros
2 Thomopoulos. Role of Mineral Organization on the Mechanics of the Tendon-to-Bone Interface Examined via High Energy X-ray Diffraction. Poster presentation Musculoskeletal Research Center 4th Annual Winter Symposium, St. Louis, MO, February 12, 2014.
 - 1 Deymier-Black, A.C., A.G. Schwartz, Z. Cai, G.M. Genin, S. Thomopoulos. Role of Mineral
3 organization on the mechanics of the tendon-to-bone Interface Examined via High Energy X-ray diffraction. Poster presentation at Orthopedic Research Society 2014 Annual Meeting. New Orleans, LA. March 15-18, 2014.
 - 1 Deymier-Black, A.C., J.D. Pasteris, S. Thomopoulos. Scaling of the tendon-to-bone
4 insertion to accommodate increased loads in larger animals. Podium Presentation at Orthopedic Research Society 2014 Annual Meeting. New Orleans, LA. March 15-18, 2014.
 - 1 Deymier-Black, A.C. Effect of Unloading on the Structure and Mechanics of the Rotator Cuff
5 Tendon-to-Bone Insertion. Podium presentation at the NSBRI Summer Bioastronautics Institute. Houston, TX. May 27-30, 2014.
 - 1 J. Y. Hu, A.C. Deymier-Black, A. G. Schwartz, V. Birman, S. Thomopoulos, G. Genin.
6 Image-Based Modeling of Tendon-to-Bone Attachment. Poster presentation at the 7th World Congress of Biomechanics. Boston, MA. July 6-11, 2014.
 - 1 Deymier-Black, A.C, J. D. Pasteris, G. M. Genin, S. Thomopoulos. Allometry of the
7 Tendon-to-Bone Insertion: How the Rotator Cuffs in Large Animals Adapt to Increased Loading. Podium Presentation at the 7th World Congress of Biomechanics. Boston, MA. July 6-11, 2014.
 - 1 Stavros Thomopoulos, Victor Birman, Markus J. Buehler, Ioannis Chasiotis, Mark
8 Anastasio, Pedro Ponte-Castañeda, Asa H. Barber, Alix C. Deymier-Black, John C. Boyle, Baptiste Depalle, Pavan V.B. Kolluru, Yizhong Hu, Zhao Qin, Fatemah Sadaat, Andrea G. Schwartz, Guy M. Genin. Multi-scale mechanics of the tendon-to-bone attachment. Poster Presentation at the 2014 Multiscale Modeling (MSM) Consortium Meeting, Interagency Modeling and Analysis Group (IMAG). NIH Campus, Bethesda, MD, September 3-4, 2014.
 - 1 J. Vasseur, Pierre-Yves Guerder, Alix Deymier-Black, Nicklas Swintek, Olivier BouMatar,
9 Krishna Muralidharan, Pierre Deymier. Multi-phonon scattering processes in a one-dimensional non-linear phononic crystal. Podium presentation at the ASME International Mechanical Engineering Congress and Exhibition. Montreal, Canada, November 14-20, 2014.
 - 2 Deymier-Black, A.C., A.G. Schwartz, Z. Cai, G.M. Genin, S. Thomopoulos. Role of Mineral
0 Organization on the Mechanics of the Tendon-To-Bone Interface Examined via High Energy

- X-Ray Diffraction. Poster Presentation at the Human Research Program Investigator's Workshop. Galveston, TX. Jan 13-15, 2015.
- 2 Deymier-Black, A.C., A.G. Schwartz, Z. Cai, G.M. Genin, S. Thomopoulos. Effect of
1 Unloading on the Organization of Mineral Crystals at the Tendon-to-Bone Attachment. Poster Presentation at the Musculoskeletal Research Center Winter Symposium. St Louis, MO. Feb 16, 2015.
- 2 Deymier-Black, A.C., Y. An, A.G. Schwartz, G.M. Genin, S. Thomopoulos, A.H. Barber.
2 Micrometer Scale Mechanical Properties of the Tendon-to-Bone Attachment. Podium Presentation at SB3C. Snowbird, UT. June 17-20, 2015.
- 2 Deymier-Black, A.C., A.K. Nair, B. Depalle, Z. Qin, K. Arcot, C.H. Yoder, M.J. Buehler, S.
3 Thomopoulos, G.M. Genin, J.D. Pasteris. Carbonate Substitution in Biological Apatites Controls Crystal Size via Lattice Strain. Poster presentation at the Crystal Growth and Assembly Gordon Research Conference. Biddeford, ME. June 28-July 3, 2015.
- 2 Deymier-Black, A.C., A.G. Schwartz, S. Thomopoulos. Effect of Unloading on the Structure
4 and Mechanics of the Rotator Cuff Tendon-to-Bone Insertion. Poster presentation presented at the Human Research Project Investigator's Workshop. Galveston, TX. Feb 8-11, 2016.
- 2 Deymier-Black, A.C., Andrea G. Schwartz, Stavros Thomopoulos. The Effect of Muscle
5 Unloading on the Adult Tendon-to-Bone Attachment. Poster presentation presented at the Orthopedic Research Society 2016 Annual Meeting. Orlando, FL. March 5-8, 2016.
- 2 Deymier-Black, A.C., Y. An, A.G. Schwartz, G.M. Genin, S. Thomopoulos, A.H.
6 Barber. Micromechanical Tensile Properties of Tendon-to-Bone Attachment. Poster presentation presented at the Orthopedic Research Society 2016 Annual Meeting. Orlando, FL. March 5-8, 2016.
- 2 Deymier-Black, A.C., A.K. Nair, B. Depalle, Z. Qin, K. Arcot, C.H. Yoder, M.J. Buehler, S.
7 Thomopoulos, G.M. Genin, J.D. Pasteris. What Determines the Size and Mechanics of Bone-like Mineral? Podium presentation presented at the Orthopedic Research Society 2016 Annual Meeting. Orlando, FL. March 5-8, 2016.
- 2 Deymier-Black, A.C., A.K. Nair, B. Depalle, Z. Qin, K. Arcot, C. Drouet, C.H. Yoder, M.J.
8 Buehler, S. Thomopoulos, G.M. Genin, J.D. Pasteris. Protein-free synthesis and mechanical control of carbonated apatite nanoparticles. Podium presentation and Poster presented at the Biomineralization Gordon Conference. Girona, Spain. Aug 14-19, 2016.
- 2 Deymier, A.C., Andrea G. Schwartz, Zhonghou Cai, Guy M. Genin, Stavros Thomopoulos.
9 Consequences of Unloading on the Structure and Mechanics of the Enthesis. Poster Presentation at the 5th Annual Musculoskeletal Repair and Regeneration Symposium. Bronx, NY. Oct 13, 2016.
- 3 Deymier-Black, A.C., A.K. Nair, B. Depalle, Z. Qin, K. Arcot, C. Drouet, C.H. Yoder, M.J.
0 Buehler, S. Thomopoulos, G.M. Genin, J.D. Pasteris. Protein-free synthesis and mechanical control of carbonated apatite nanoparticles. Poster presentation at the Columbia University Postdoc Research Symposium. New York, NY. Oct 14, 2016.
- 3 Deymier, A.C., Yiran An, Andrea G. Schwartz, Guy M. Genin, Stavros Thomopoulos, Asa H.
1 Barber. Micromechanical Tensile Properties of Tendon-to-Bone Attachment. Poster presentation at the Orthopedic Research Society Meeting. San Diego, CA. Mar 19-22, 2017.
- 3 Deymier, A.C., Andrea G. Schwartz, Zhonghou Cai, Guy M. Genin, Stavros Thomopoulos.
2 The Effects of Unloading on the Structure and Mechanics of the Tendon Enthesis. Poster presentation at the Orthopedic Research Society Meeting. San Diego, CA. Mar 19-22, 2017.
- 3 Deymier, A.C., Andrea G. Schwartz, Zhonghou Cai, Guy M. Genin, Stavros Thomopoulos.
3 Structural and Mechanical Consequences of Unloading on the Tendon-To-Bone Attachment. Podium presentation at the Summer Biomechanics, Bioengineering, and Biotransport Conference. Tucson, AZ. June 21-24, 2017.
- 3 Deymier, A.C. Arun K. Nair, Baptiste Depalle, Zhao Qin, Kashyap Arcot, Christophe
4 Drouet, Claude H. Yoder, Markus J. Buehler, Stavros Thomopoulos, Guy M. Genin, Jill D. Pasteris. The Role of Carbonate on Protein-Free Formation of Bone-Like Apatite. Podium

- presentation at the Summer Biomechanics, Bioengineering, and Biotransport Conference. Tucson, AZ. June 21-24, 2017.
- 3 Deymier, A.C., A.G. Schwartz, Z. Cai, G.M. Genin, J. Pasteris, S. Thomopoulos. Unloading
5 Leads to Multiscale Structural Changes and Compromised Mechanics of the
Tendon-to-Bone Attachment. Poster presentation at the 8th World Congress of
Biomechanics. Dublin, Ireland. July 8-12, 2018.
- 3 Pasteris, J.D., C.H. Yoder, C. Krywka, P. Zaslansky, A.C. Deymier. Carbonate substitution
6 of biomimetic bone apatite affects crystal mechanics. Poster presentation at the
Biom mineralization Gordon Conference. New London, NH. July 29-Aug 3, 2018.
- 3 **Wingender, B., K. Morozov, A.C. Deymier. The effects of diet-induced metabolic
7 Acidosis on the structure and mechanical function of mouse femur and the
humerus-supraspinatus tendon enthesis. Poster presentation at the 7th Annual
Musculoskeletal Repair and Regeneration Symposium. New York, NY. Oct11, 2018.**
- 3 **Wingender, B., M. Azuma, C. Krywka, P. Zaslansky, J. Boyle, A. Deymier. The Effect of
8 Composition and Hydration on the Mechanics of Carbonated Apatite. Poster
presentation at SB3C. Seven Springs, PA. June 25-28, 2019.**
- 3 **Morozov, K., B. Wingender, A. Peterson, A. Deymier. Metabolic Acidosis Causes
9 Physio-Chemically Induced Mechanical and Compositional Changes to Murine
Bones. Podium presentation at SB3C. Seven Springs, PA. June 25-28, 2019.**
- 4 **Peterson, A. R. Abraham. K. Morozov, B. Wingender, A. Deymier. Effects of Metabolic
0 Acidosis on Murine Bone Mechanics and Composition. Poster presentation at the 8th
Annual Musculoskeletal Repair and Regeneration Symposium. Bronx, NY. Oct 3,
2019.**
- 4 **Wong, S., M. Moynahan, A. Deymier. The Effect of pH and Buffer Capacity on the
1 Dissolution of CHA. Poster Presentation at the 8th Annual Musculoskeletal Repair
and Regeneration Symposium. Bronx, NY. Oct 3, 2019.**
- 4 **Peterson, A., I. Nakashima, R. Abraham, A. D'Angio, T. Schmidt, A. Deymier. Effects
2 of Chronic Acidosis on Murine Bone Composition, Structure, and Mechanics.
Podium Presentation at SB3C. Virtual Conference. June 17-20, 2020.**
- 4 **Wong, S., M. M. Moynahan, A.C. Deymier. The effect of pH and Buffer Capacity on the
3 Dissolution of Carbonate-substituted Calcium Apatite. Podium Presentation at SB3C.
Virtual Conference. June 17-20, 2020.**
- 4 **Peterson, A., I. Nakashima, R. Abraham, A. D'Angio, T. Schmidt, A. Deymier. Effects
4 of Metabolic Acidosis on Murine Bone. Poster Presentation at the 9th Annual
Musculoskeletal Repair and Regeneration Symposium. Virtual Conference. Oct 8,
2020.**
- 4 **Wong, S., M. Moynahan, A.C.Deymier. The Effect of Dry Mouth Oral Rinses on the
5 Composition and Structure of Dental Mineral. Poster presentation at the 9th Annual
Musculoskeletal Repair and Regeneration Symposium. Virtual Conference. Oct 8,
2020.**
- 4 **Peterson, A.K. , M. Moody , B. Wingender , K. Morozov , I. Nakashima , T.A. Schmidt,
6 A.C. Deymier. The Role of the Skeletal System in a Novel Murine Model of Chronic
Metabolic Acidosis. Podium Presentation at ORS. Feb 12-16, 2021**
- 4 **Moody, M., A. Peterson, B. Wingender, K. Morozov, I. Nakashima, T. Schmidt, A.
7 Deymier. The skeletal Response to Varied Models of Metabolic Acidosis. Podium
Presentation at SB3C. Virtual Conference. June 14-18, 2021.**
- 4 **Wong, S., M. M. Moynahan, A.C. Deymier. Solution Composition Affects
8 Dissolution-Recrystallization Mechanisms of Biomimetic Apatite. Podium
Presentation at SB3C. Virtual Conference. June 14-18, 2021.**
- 4 **Golman, M, J.D. Almer, S. Thomopoulos, A.C. Deymier. Understanding the Mechanism of
9 Load Transfer in the Tendon-to-Bone Attachment. Podium Presentation at SB3C. Virtual
Conference. June 14-18, 2021.**
- 5 **Moody, M.K., A.K. Peterson, B. Wingender, K. Morozov, I. Nakashima, M. Easson, T.A.
0 Schmidt, A.C. Deymier. The Skeletal Response to Varied Models of Metabolic**

- Acidosis. Poster presentation at the 10th Annual Musculoskeletal Repair and Regeneration Symposium. Virtual Conference. Oct 20, 2021.
- 5 Nelson, A., S. Nag, T. Schmidt, A.C. Deymier. Acidosis Affects the Composition and
1 Mechanics of the Tendon-to-Bone Attachment. Poster presentation at the 10th Annual Musculoskeletal Repair and Regeneration Symposium. Virtual Conference. Oct 20, 2021.
- 5 Wong, S., M. Moynahan, A.C. Deymier. Solution Composition Affects
2 Dissolution-Recrystallization Mechanisms of Biomimetic Apatites. Poster presentation at the 10th Annual Musculoskeletal Repair and Regeneration Symposium. Virtual Conference. Oct 20, 2021.
- 5 Easson, M., S. Wong, A.C. Deymier. Ex vivo acid exposure of bones mimics in vivo
3 acidosis. Poster presentation at the 10th Annual Musculoskeletal Repair and Regeneration Symposium. Virtual Conference. Oct 20, 2021.
- 5 Wong, S.L., M.M. Moynahan, A.C. Deymier. Solution Composition Affects
4 Dissolution-Recrystallization Mechanisms of Biomimetic Apatites Oral presentation at Les Journées Annuelles 2022 du Groupe Français de la Céramique, Albi, France. March 22-24, 2022.
- 5 Easson, M., S. Wong, M.M. Moody, T.A. Schmidt, A. Deymier. Physiochemical
5 Mechanisms of Bone Dissolution Play A significant Role In Regulating Bone Composition And Function In Acidosis. Poster Presentation at SB3C. Chesapeake Bay, MD. June 20-23, 2022.
- 5 Wong, S.L., C. Drouet, A.C. Deymier. Elucidating the Effects of K⁺ and Na⁺ on
6 Carbonate Substitution in Biomimetic Apatites. Poster presentation at the Biomineralization Gordon Research Conference. Castelldefels, Spain. Aug 14-19, 2022.
- 5 Deymier, A.C., P.A. Deymier, M. Latypov, K. Muralidharan. Thermodynamic Effects of
7 Stress on the Dissolution/recrystallization of Apatite in Aqueous Environments. Poster presentation at the Biomineralization Gordon Research Conference. Castelldefels, Spain. Aug 14-19, 2022.
- 5 Moody, M., A. Peterson, M. Easson, T. Schmidt, A. Deymier. Murine Bones Exhibit a
8 Temporal Response to Diet-Induced Acidosis. Poster Presentation at ASBMR Annual Meeting. Austin, TX. Sept 9-12, 2022.
- 5 Canalis E., T. Carpenter, L. Cruz-Aviles, L. Schilling, A. Deymier, B. Hao, J. Yu. A
9 Pathogenic Variant of NOTCH2 Causes Osteogenesis Imperfecta. Poster Presentation at ASBMR Annual Meeting. Austin, TX. Sept 9-12, 2022.
- 6 Moody, M. S. Whittaker. A.C. Deymier. The Effects of Acidic Challenge on Bone in Ex
0 Vivo Models. Poster Presentation at the Bones & Teeth Gordon Research Conference. Ventura, CA. Sept 18-23, 2022.
- 6 Deymier, P.A., M. Latypov, K. Muralidharan, A.C. Deymier. Applied Stress Promotes
1 Mineralization of Substituted Bioapatites: a Thermochemical Equilibrium Study. Poster Presentation at SB3C. Vail, CO. June 4-8, 2023.
- 6 Katebifer, S., M. Truhlar, R. Kroger, A. Deymier. Variable Gradients in Mineral
2 Content, Crystallinity And Phase May Be Responsible For Mechanical Resilience Of The Dentin-Enamel Junction. Poster Presentation at SB3C. Vail, CO. June 4-8, 2023.
- 6 Rosenberg, B.S., M. Truhlar, S. Katebifar, A.C. Deymier. Micro-Computed Tomography
3 for The Determination of The Dentin-Enamel Junction Density Gradient Width. Poster Presentation at SB3C. Vail, CO. June 4-8, 2023.
- 6 Deymier, A., P. Deymier, M. Latypov, K. Muralidharan. Thermodynamic Effects of
4 Stress on the Crystal Growth of Apatite in Aqueous Environments. Oral presentation at ACCGE. Tucson, AZ. Aug 13-18, 2023.
- 6 Moody, M. N. Zainadine, T. Doktorski, T.A. Schmidt, A.C. Deymier. Bicarbonate
4 Supplementation Alters Composition of Murine Bone Under Acidotic Conditions. Oral Presentation at BMES. Seattle, WA. Oct 11-14, 2023.

- 6 **Moody, M, S. Whittaker, T. Schmidt, A. Deymier. From Mouse to Culture: Developing**
5 **Bone Explants for Future Acid-Base Studies. Presentation at ICCBMT. Oosterbeek,**
NL. Oct 22-27, 2023.
- 6 **Wong, S., C. Drouet, A. Deymier. Alterations of the carbonate environment with Na or**
6 **K substitution in biomimetic apatites. Presentation at ICCBMT. Oosterbeek, NL. Oct**
22-27, 2023.

IV. **Peer Reviewed Publications** (bolded publications are directly from the Deymier Lab)

- 1 Deymier, A.C., J.D. Almer, S.R. Stock, D.R. Haeffner, and D.C. Dunand, High Energy
X-ray Diffraction Measurement of Load Transfer Between Hydroxyapatite and Collagen in
Bovine Dentin, in Structure-Property Relationships in Biomineralized and Biomimetic
Composites, D. Kisailus, et al., Editors. 2009, Materials Research Society: Warrendale. p.
161-166.
- 2 Deymier-Black, A.C., J.D. Almer, S.R. Stock, D.R. Haeffner, and D.C. Dunand,
Synchrotron X-ray diffraction study of load partitioning during elastic deformation of bovine
dentin. *Acta Biomaterialia*, 2010. 6: p. 2172-2180.
- 3 Deymier-Black, A.C., J.D. Almer, D.R. Haeffner, and D.C. Dunand, Effect of Freeze-Thaw
Cycles on Load Transfer between the Biomineral and Collagen Phases in Bovine Dentin.
Materials Science and Engineering: C, 2011. 38:p. 1423-1428
- 4 Singhal, A., A.C. Deymier-Black, J.D. Almer, and D.C. Dunand, Effect of high-energy X-ray
doses on bone elastic properties and residual strains. *Journal of the Mechanical Behavior*
of Biomedical Materials, 2011. 4: p.1774-1786.
- 5 Chastain, M.L., A.C. Deymier-Black, J.E. Kelly, J.A. Brown, D.C. Dunand, Metallurgical
Analysis of Copper Artifacts from Cahokia. *Journal of Archaeological Science*, 2011. 38(7):
p. 1727-1736.
- 6 Deymier-Black, A.C., J.D. Almer, and D.C. Dunand, Variability in the elastic properties of
bovine dentin at the nano-, meso- and macro-scales. *Journal of the Mechanical Behavior*
of Biomedical Materials, 2012. 5: p. 71-81.
- 7 Deymier-Black, A.C., F. Yuan, A. Singhal, J.D. Almer, L.C. Brinson, and D.C. Dunand,
Evolution of load transfer between hydroxyapatite and collagen during creep deformation
of bone. *Acta Biomaterialia*, 2012. 8: p.253-261.
- 8 Singhal, A., A.C. Deymier-Black, J.D. Almer, L.C. Brinson, and D.C. Dunand, Effect of
Stress and Temperature on the Creep Behavior of Bone and Dentin. *Materials Science*
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load-free conditions. *Acta Biomaterialia* .2012. 9: p. 5305-5312.
- 1 Deymier-Black, A.C., A. Singhal, F. Yuan, J.D. Almer, L.C. Brinson, and D.C. Dunand,
0 Effect of High-Energy X-ray Irradiation on Creep Mechanisms in Bone and Dentin. *Journal*
of the Mechanical Behavior of Biomedical Materials. 2013. 21: p. 17-31.
- 1 Deymier-Black, A.C., A. Veis, S.R. Stock. Crystallographic texture and elemental
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1-10.
- 1 Gallant, M.A. , D.M. Brown, M. Hammond, J. M. Wallace, J. Du, A.C. Deymier-Black, J.D.
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the skeleton: A novel mechanism for improving bone material properties. *Bone*,2014. 61:
p. 191-200.
- 1 Stock S.R., A.C. Deymier-Black, A. Veis, A.G. Telser, E.J. Lux, Z. Cai. Bovine and equine
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- 1 Guerder, P.-Y., A. C. Deymier-Black, N. Z. Swintek, J.O. Vasseur, O. Bou-Matar, K.
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anharmonic biological superlattices: understanding the dissipation of mechanical waves in
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p. 24-32.

- 1 Dorvee, J.R., A. C. Deymier-Black, L. Gerkowicz, A. Veis. Peritubular Dentin, a highly
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dissection. *Connect Tissue Research*, 2014, Suppl 1: p. 9-14.
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- 1 Deymier, A.C., L. Smith, J. Boyle, Z. Li, S. Linderman, J. Pasteris, Y. Xia, G. Genin, S.
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- 1 Dorvee, Jason R., L. Gerkowicz, S. Bahmanyar, A.C. Deymier-Black, A. Veis. Chondroitin
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Journal of the Mechanical Behavior of Biomedical Materials, 2016. 62: p. 24-32.
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Biomaterialia*, 2017. 56: p.25-35.
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New insights into the key role of carbonation. *Biomaterials*, 2017. 127: p.75-88.
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- 3 **Rinses Affect Composition and Structure of Biomimetic Dental Mineral. PlosOne,**
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- delivery promotes rotator cuff regeneration in a rat model. J Biomed Mater Res. 2022;**
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- metabolic and functional maturation of differentiated human cardiomyocytes. Cell Reports.**
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- 3 **Wong, S., AC Deymier. Phosphate and Buffer Capacity effects on Biomimetic**
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- equilibrium study. Philosophical Transactions A. 2023. 381:20220242.**
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- 9 **substitution in biomimetic apatites. Materialia. 2023. 29: 101795.**
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- Ex-Vivo Study. Oral Surgery, Oral Medicine, Oral Pathology, and Oral Radiology.**
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- 4 **Deymier, A., P.A. Deymier, K. Muralidharan, M. Latypov. Thermodynamics of the**
- 1 **solid-liquid phase equilibrium of a binary system: Effect of a chemical reaction in**
- the liquid and epitaxial strain in the solid. Acta Materialia. 2023. 259: 119299.**
- 4 **Moody, M., Peterson, A., B. Wingender, K. Morozov, I Nakashima, M. Easson, R.**
- 2 **Abraham, T. Schmidt, L. Caromile, A.C. Deymier. Murine bone exhibits temporal**
- response to metabolic acidosis. Orthopedics and Rheumatology. 2023. 22(1):1-15.**
- 4 **Menon, N.G., A.P Tanguay, L. Zhou, L.X. Zhang, C.E. Bobst, M. Han, M. Ghosh, G.W.**
- 3 **Greene, A. Deymier, B.D. Sullivan, Y. Chen, G.D Jay, T.A. Schmidt. A Structural and**
- Functional Comparison Between Two Recombinant Human Lubricin Proteins:**
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- 4 **Moody, M., T. Schmidt, R. Trivedi, A.C. Deymier. Administration of alendronate**
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- 4 **Easson, M., S. Wong, M. Moody, T.A. Schmidt, A.C. Deymier. Physiochemical**
- 5 **mechanisms of bone dissolution play a significant role in regulating bone**
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- Biomedical Materials. 2023. Under Review. (Response to Reviewers submitted 3/31)**
- 4 **Nag, S., I. DeBruyker, A. Nelson, M. Fais, A.C. Deymier. Acidosis Induces Significant**
- 6 **Changes to the Murine Supraspinatus Enthesis Organic Matrix. Connective Tissue**
- Research. 2023. Under Review. (Response to Reviewers submitted 9/11)**
- 4 **Tanguay, Adam P., N.G. Menon, M. Hamilton Boudreau, P.S. Woods, E.A. Doyle, W.B.**
- 7 **Edwards, G.D. Jay, A.C. Deymier, J. Lorenzo, S.-K. Lee, T.A. Schmidt. PRG4 Deficiency in**
- Mice Alters Skeletal Structure, Mechanics, and Clavicular Osteoclastogenesis, and rhPRG4**
- Inhibits In Vitro Osteoclastogenesis. Journal of Orthopedic Research. 2023. Under Review.**
- 4 **Deymier, A.C., P.A. Deymier. Open-system force-elongation relationship of collagen**
- 8 **in chemo-mechanical equilibrium with water: effect of molecular coiling. Journal of**
- the Mechanical Behavior of Biomedical Materials. 2023. Under Review.**

GRANTS RECEIVED AND APPLIED FOR (Including dollar amounts, % effort, and role of candidate on grant, as per NIH Other Support page)

I. Current:

Title: CAREER: A New Science of Skeletal and Physiological Systems: using integrated approaches to elucidate mineralized tissue properties and behavior

Major Goals: The goal is to fully elucidate the relationship between skeletal composition, especially in terms of HPO_4^{2-} ionic content, structure and physiological acid/base regulation by developing a laboratory that can apply advanced transdisciplinary characterization tools and investigative methods.

Status of Support: Active

Project Number: NSF 2044870

Name of PD/PI: Deymier, Alix

Source of Support: NSF

Primary Place of Performance: UConn Health

Project/Proposal Start and End Date: 01/01/2021 - 12/31/2025

Total Award Amount (including Indirect Costs): \$547,553

Person Months (Calendar/Academic/Summer) per budget period.

Year (YYYY)	Person Months (##.##)
2021	1.2
2022	1.2
2023	1.2
2024	1.2
2025	1.2

Title: Elucidating the compositional, structural and mechanical effects of Dentinogenesis Imperfecta on the Dentin-Enamel Junction

Major Goals: Dentinogenesis Imperfecta (DGI) describes a group of conditions with dental mineralization defects characterized by translucent crowns, small dentinal tubules, and enamel loss at the dentin-enamel junction (DEJ) necessitating restoration treatments. To elucidate the cause of enamel attrition in DGI dentition, we propose to investigate hierarchical structural alterations of the DEJ in a DGI mouse model (Col1a2oim) and determine how they affect DEJ mechanical function using state-of-the-art multiscale high resolution tomography and diffraction techniques. This data will be unified into cohesive and complete models of healthy and DGI-affected DEJs which will be used in the future to probe the DEJs response to pathological forces and restorative treatments.

Status of Support: Active

Project Number: 1R03DE30228-01A1

Name of PD/PI: Deymier, Alix

Source of Support: NIH

Primary Place of Performance: UConn Health

Project/Proposal Start and End Date: 06/01/2022 – 05/31/2024

Total Award Amount (including Indirect Costs): \$328,000

Person Months (Calendar/Academic/Summer) per budget period.

Year (YYYY)	Person Months (##.##)
2022	2.4
2023	2.4

Title: A Notch2 Mutant Causes Osteogenesis Imperfecta

Major Goals: These investigations will clarify the mechanisms responsible for a syndrome causing skeletal fragility and fractures. The proposed work will serve to establish the function and mechanisms of activation of an important gene mutation. The work will enhance our understanding of genetic disorders affecting the skeleton.

Status of Support: Active

Project Number: R21 AR080642-01A1

Name of PD/PI: Canalis, Ernesto

Source of Support: NIH

Primary Place of Performance: UConn Health

Project/Proposal Start and End Date: 04/01/2023 – 02/28/2026

Total Award Amount (including Indirect Costs): \$ \$451,000.00

Person Months (Calendar/Academic/Summer) per budget period.

Year (YYYY)	Person Months (##.##)
2024	0.24
2025	0.24

Title: Multiphysics Multiscale Fundamental Understanding of Pathological Mineralization in Calcified tendinopathy

Major Goals: Calcific tendinopathy is a condition in which pathological mineralization occurs in tendon tissue leading to pain and limitations in mobility. This condition primarily affects athletes suggesting that mechanical loading is at least in part responsible for mineral growth. We will be applying a combined in silico and in vitro approach to understanding how external applied loads affect the tendon matrix microenvironment and in turn its propensity for mineral growth.

Status of Support: Awarded

Project Number: 23RT0391

Name of PD/PI: Deymier, Alix

Source of Support: DoD

Primary Place of Performance: UConn Health

Project/Proposal Start and End Date: (MM/YYYY) (if available): 09/01/2023 – 08/31/2026

Total Award Amount (including Indirect Costs): \$ 578,891.00

Person Months (Calendar/Academic/Summer) per budget period.

Year (YYYY)	Person Months (##.##)
2023	0.72
2024	0.72
2025	0.72

Title: Collaborative Research: Predicting the Mechanical Properties of Biomimetic Apatite Crystals Due to Co and Cr Ion Substitutions

Major Goals Cobalt and Chrome are leached from implant materials into the bone matrix. There is evidence that these metallic ions are uptaken by bone mineral. The uptake of these ions into the apatite mineral structure is expected to affect the lattice structure as well as the mechanical properties of the crystals. We will investigate how ion uptake may affect mineral properties and the effects on bone mechanics.

Status of Support: Awarded

Project Number: #107141

Name of PD/PI: Deymier, Alix

Source of Support: NSF

Primary Place of Performance: UConn Health/University of Arkansas

Project/Proposal Start and End Date: 09/01/2023-08/31/2026

Total Award Amount (including Indirect Costs): \$329,025.00

Person Months (Calendar/Academic/Summer) per budget period.

Year (YYYY)	Person Months (##.##)
2024	0.72
2025	0.72
2026	0.72

II. Pending:

Title: Effects of Bicarbonate Treatments on Bone Mineral Quality

Major Goals: Metabolic acidosis is a growing problem that affects 3 million Americans annually resulting in severe cardiac and skeletal consequences and significantly increasing patient mortality rates. Current treatments for metabolic acidosis have challenges with appropriate dosing, drug interactions, and their ability to restore bone health. In this study, we will take a new perspective examining the effect of treatment on bone mineral to optimize the use of bicarbonate treatments such that they not only remedy the acidosis, but also improve bone health and function, resulting in improved patient quality of life.

Status of Support: Pending

Project Number: AN # 4838110

Name of PD/PI: Deymier, Alix

Source of Support: NIH

Primary Place of Performance: UConn Health

Project/Proposal Start and End Date: 04/01/2024-03/31/2029

Total Award Amount (including Indirect Costs): \$ \$2,080,942.00

Person Months (Calendar/Academic/Summer) per budget period.

Year (YYYY)	Person Months (##.##)
2024	3
2025	3
2026	3
2027	3
2028	3

III. Completed:

Title: Skeletal Phenotyping of Heterozygotes from IMPC Embryonic Lethal Lines

Major Goals: Approximately 50 mouse lines carrying an engineered inactivation of a specific gene that causes embryonic lethality will be analyzed for its effect on the bony skeleton. The study is performed on the heterozygous carrier of the mutant gene. The results of the analysis and its interpretation will become publicly available on a web portal maintained by this funding source. Efforts to engage the broader bone research community to study the identified abnormal mouse lines in greater detail will be developed so that a greater scientific return on the investment for the discovery of bone genes will be realized.

Status of Support: Completed

Project Number: 1R01HD098636

Name of PD/PI: Rowe, David

Source of Support: NIH

Primary Place of Performance: UConn Health

Project/Proposal Start and End Date: 4/2/19-3/31/24

Total Award Amount (including Indirect Costs): \$ 2,804,606

Person Months (Calendar/Academic/Summer) per budget period.

Year (YYYY)	Person Months (##.##)
2019	0.5
2020	0.5
2021	0.5
2022	0.5
2023	0.5

Title: Bone Metastasis in a Dish- A novel way to personalize cancer treatment

Major Goals: Develop a 3D printed model of prostate cancer bone metastasis.

Status of Support: Completed

Project Number: Start Preliminary Proof-of-Concept Fund

Name of PD/PI: Caromile, Leslie

Source of Support: UConn/UConn Health

Project Proposal Start and End Date: 06/15/2021-01/20/2022

Total Award Amount (including Indirect costs): \$10,000

Person Months (Calendar/Academic Summer) per budget period: N/A

IV. Applied for but not funded:

Title: Elucidating the Role of acidosis disease processes on compromised skeletal composition, structure, and mechanical function

Major Goals: Acidemia, a condition in which the body's pH is reduced, has been shown to increase both the risk of bone fracture and the likelihood of cancerous bone metastases leading to increased mortality for millions annually. The disease process by which acidemia affects bone health remains unknown with both cellular and chemical mechanisms having been suggested. In this study, we will isolate the processes responsible for changes in bone during acidemia and determine which current treatments are most effective at inhibiting them and maintaining bone health.

Status of Support: Not Funded

Project Number: R01AR082331

Name of PD/PI: Deymier, Alix

Source of Support: NIH

Primary Place of Performance: UConn Health

Project/Proposal Start and End Date: 04/01/2023 - 03/31/2028

Total Award Amount (including Indirect Costs): \$2,050,000

Person Months (Calendar/Academic/Summer) per budget period.

Year (YYYY)	Person Months (##.##)
2023	1.8
2024	1.8
2025	1.8
2026	1.8
2027	1.8

Title: Elucidating Mechanisms of Crack-resistance at the Dentin-Enamel Junction

Major Goals: The PI hypothesizes that the DEJs of DGI mice will exhibit reduced gradient widths leading to more abrupt mechanical interfaces and increased fracture risk. Data collected from

these tissues will be unified into a multiscale 3D model that will be used to predict the DEJ function and inform biomimetic interfacial design.

Status of Support: Not Funded

Project Number: NSF 2151051

Name of PD/PI: Deymier, Alix

Source of Support: NSF

Primary Place of Performance: UConn Health

Project/Proposal Start and End Date: (MM/YYYY) (if available):04/01/2022 -- 03/31/2025

Total Award Amount (including Indirect Costs): \$452,481

Person Months (Calendar/Academic/Summer) per budget period.

Year (YYYY)	Person Months (##.##)
2022	0.72
2023	0.72
2024	0.72

Title: Multimodal delivery of therapeutics for diabetic wounds

Major Goals: This proposal aims to control the inflammation level while inhibiting bacterial growth will enhance the healing process. Our approach is to make a multifunctional wound dressing by incorporating innovative enzyme-responsive peptides for anti-IL-6 release to prevent excessive inflammation, controlled releasing PRG4 to modulate immune cells towards pro-healing phenotypes, and VEGF induces angiogenesis and vascularization to support tissue regeneration. The outcome of this research will revolutionize the management of diabetic ulcers and wounds in the clinics.

Status of Support: Not Funded

Project Number: PR212212

Name of PD/PI: Tamayol, Ali

Source of Support: Terasaki Institute

Primary Place of Performance: UConn Health

Project/Proposal Start and End Date: 04/01/2022 -- 03/31/2026

Total Award Amount (including Indirect Costs):

Person Months (Calendar/Academic/Summer) per budget period.

Year (YYYY)	Person Months (##.##)
2022	0.6
2023	0.6
2024	0.6
2025	0.6

Title: Chronic Acidosis Effects on Rotator Cuff Degeneration and Recovery

Major Goals: The population at highest risk for rotator cuff tears is also the population most likely to have acidosis; we therefore theorize that acidosis may be a significant contributor to rotator cuff damage. We will use state-of-the art technology to identify how acidosis affects multiscale rotator cuff composition, structure, mechanics, and biological function during disease and recovery. The results of this study will provide the necessary information for the efficient development of preventative treatments and rehabilitation for those at risk for acidosis and rotator cuff tears.

Status of Support: Not Funded

Project Number: R01AR078896

Name of PD/PI: Deymier, Alix

Source of Support: NIH

Primary Place of Performance: UConn Health

Project/Proposal Start and End Date: 04/01/2023 - 03/31/2028

Total Award Amount (including Indirect Costs): \$2,050,000

Person Months (Calendar/Academic/Summer) per budget period.

Year (YYYY)	Person Months (##.##)
2023	2.4
2024	2.4
2025	2.4
2026	2.4
2027	2.4

Title: NSF Engineering Research Center for Cellular Agriculture in Food Engineering and Manufacturing

Major Goals: There is a need for realistic artificial meats. This grant seeks to create a variety of artificial proteins using food engineering.

Status of Support: Not Funded

Project Number: Engineering Research Center

Name of PD/PI: Tamayol, Ali

Source of Support: NSF

Primary Place of Performance: UConn Health

Project/Proposal Start and End Date: 09/01/2022 - 08/31/2027

Total Award Amount (including Indirect Costs): \$2,050,000

Person Months (Calendar/Academic/Summer) per budget period.

Year (YYYY)	Person Months (##.##)
2022	2.4
2023	2.4

Year (YYYY)	Person Months (##.##)
2024	2.4
2025	2.4
2026	2.4

Title: Elucidating the DEJ structure of Amelogenesis Imperfecta Teeth to Minimize Enamel Loss

Major Goals: Amelogenesis imperfecta (AI) is a condition characterized by abnormal enamel formation that causes early functional failure and extensive dental restoration. In AI patients both the dentin and compromised enamel exhibit weak bonding therefore it is necessary to find alternative structures in AI dentition that improve bonding. The DEJ, thanks to its unique structure and ability to minimize stress concentrations, has greater bond strength than enamel in healthy teeth. I hypothesize that the DEJ of AI teeth retain sufficient organizational features to minimize stress concentrations and increase resin bonding strength.

Status of Support: Not Funded

Project Number: Colgate Award for Research Excellence

Name of PD/PI: Deymier, Alix

Source of Support: Colgate

Primary Place of Performance: UConn Health

Project/Proposal Start and End Date: 7/1/20-6/30/21

Total Award Amount (including Indirect Costs): \$33,000.00

Person Months (Calendar/Academic/Summer) per budget period: N/A

Title: Determining RANKL-ORG1 Relationships in Metabolic Acidosis-Induced Bone Loss

Major Goals: The population at highest risk for rotator cuff tears is also the population most likely to have acidosis; we therefore theorize that acidosis may be a significant contributor to rotator cuff damage. We will use state-of-the art technology to identify how acidosis affects multiscale rotator cuff composition, structure, mechanics, and biological function during disease and recovery. The results of this study will provide the necessary information for the efficient development of preventative treatments and rehabilitation for those at risk for acidosis and rotator cuff tears.

Status of Support: Not Funded

Project Number: R01AR078242

Name of PD/PI: Deymier, Alix

Source of Support: NIH

Primary Place of Performance: UConn Health

Project/Proposal Start and End Date: 09/01/2020 - 08/31/2025

Total Award Amount (including Indirect Costs): \$2,050,000

Person Months (Calendar/Academic/Summer) per budget period.

Year (YYYY)	Person Months (##.##)
2020	2.4
2021	2.4
2022	2.4
2023	2.4
2024	2.4

Title: Elucidating the structural and compositional effects of Amelogenesis Imperfecta type II on the Dentin-Enamel Junction

Major Goals: Amelogenesis imperfecta (AI) is a condition characterized by abnormal enamel formation that causes early functional failure and extensive dental restoration. In AI patients both the dentin and compromised enamel exhibit weak bonding therefore it is necessary to find alternative structures in AI dentition that improve bonding. The DEJ, thanks to its unique structure and ability to minimize stress concentrations, has greater bond strength than enamel in healthy teeth. I hypothesize that the DEJ of AI teeth retain sufficient organizational features to minimize stress concentrations and increase resin bonding strength.

Status of Support: Not Funded

Project Number: Colgate Award for Research Excellence

Name of PD/PI: Deymier, Alix

Source of Support: Colgate

Primary Place of Performance: UConn Health

Project/Proposal Start and End Date: 7/1/19-6/30/20

Total Award Amount (including Indirect Costs): \$33,000.00

Person Months (Calendar/Academic/Summer) per budget period: N/A

Title: Metabolic Acidosis Induced Bone Loss: What Causes it and How do we treat it?

Major Goals: Metabolic Acidosis affect millions of individuals annually and can cause significant bone loss. However, the mechanism for this dissolution is unclear. The goal is to identify the mechanism and determine how it affects treatment.

Status of Support: Not Funded

Project Number: WISTEM2D Scholars Award

Name of PD/PI: Deymier, Alix

Source of Support: Johnson & Johnson

Primary Place of Performance: UConn Health

Project/Proposal Start and End Date: 1/1/20-12/31/2021

Total Award Amount (including Indirect Costs): \$150,000.00

Person Months (Calendar/Academic/Summer) per budget period: N/A

Title: Determination of the Role of disuse-induced acidosis on musculoskeletal structures and mechanics during unloading

Major Goals: Immobilization of musculoskeletal tissue, i.e. during injury recovery, causes a shift in muscle metabolism resulting in production of excess acid in extracellular milieu. We propose to use a novel MRI technique to measure spatial and temporal changes in tissue acidity in murine shoulders paralyzed via botox both with and without sodium bicarbonate treatment. Comparison of acid distributions along with structural, compositional, and biomechanical changes to the tissue after paralysis will allow for a shift in mechanistic understanding of treating immobilization for individuals with injuries, paralysis, hemiplegias, on bedrest, and even during spaceflight.

Status of Support: Not Funded

Project Number: R21AR076020

Name of PD/PI: Deymier, Alix

Source of Support: NIH

Primary Place of Performance: UConn Health

Project/Proposal Start and End Date: 07/01/2019 - 06/30/2021

Total Award Amount (including Indirect Costs): \$454,517.00

Person Months (Calendar/Academic/Summer) per budget period.

Year (YYYY)	Person Months (##.##)
2019	2.4
2020	2.4
2021	2.4

Title: Determination of hierarchical intervertebral disc degeneration effects and treatment in injury and congenital conditions

Major Goals: Back pain is a wide-spread problem for individuals of all ages. Part of this pain is caused by disc degeneration. However, we do not truly understand how degeneration affects disc composition, structure, and mechanics. Our goal was to identify structure function relationships in the disc as a function of degeneration and how treatment can rescue these changes.

Status of Support: Not Funded

Project Number: R01

Name of PD/PI: Moss, Isaac

Source of Support: NIH

Primary Place of Performance: UConn Health

Project/Proposal Start and End Date: 07/01/2019 - 06/30/2024

Total Award Amount (including Indirect Costs): \$2,0555,550.0

Person Months (Calendar/Academic/Summer) per budget period.

Year (YYYY)	Person Months (##.##)
2020	1.2
2021	1.2

Year (YYYY)	Person Months (##.##)
2022	1.2
2023	1.2
2024	1.2

Title: The Relationship between Acid/Base Equilibrium and the Musculoskeletal System

Major Goals: Metabolic Acidosis affect millions of individuals annually and can cause significant bone loss. However, the mechanism for this dissolution is unclear. The goal is to identify the mechanism and determine how it affects treatment.

Status of Support: Not Funded

Project Number: WISTEM2D Scholars Award

Name of PD/PI: Deymier, Alix

Source of Support: Johnson & Johnson

Primary Place of Performance: UConn Health

Project/Proposal Start and End Date: 1/1/2019-12/31/2020

Total Award Amount (including Indirect Costs): \$150,000.00

Person Months (Calendar/Academic/Summer) per budget period: N/A

Title: Exploration of the Role of Disuse-Induced Acidosis on Reinjury Risk in Musculoskeletal Tissues

Major Goals: Shoulder injuries are extremely impactful on military readiness. They are often treated via immobilization. However, this process results in muscle degradation and release of acidic moieties. We propose to explore the formation of this acidic environment during immobilization and its effect on the structure and function of neighboring tissues.

Status of Support: Not Funded

Project Number: CDMPR Discovery

Name of PD/PI: Deymier, Alix

Source of Support: DoD

Primary Place of Performance: UConn Health

Project/Proposal Start and End Date: 07/01/19-06/30/22

Total Award Amount (including Indirect Costs): \$315,430.00

Person Months (Calendar/Academic/Summer) per budget period.

Year (YYYY)	Person Months (##.##)
2019	1.8
2020	1.8
2021	1.8

MENTORING ACTIVITIES: Mentee Names, Projects, Current Position

I. Graduate Students Last Five Years

- Primary Advisor for Biomedical Science PhD students at UConn Health
 - Stephanie Wong May (2019-Current, Expected Graduation Jan 2024)
 - Thesis title: “Investigation of bone-like mineral composition and its effects on solubility and mechanics.
 - Anna Peterson May 2018-2021
 - Thesis title: “Multiscale Evaluation of the Skeletal Response to Perturbed pH Homeostasis”
 - Current position: Product Operations Manager at Alexion
- Primary Advisor for Biomedical Engineering PhD students at UConn Health
 - Mikayla Moody (Aug 2019-Current, Expected Graduation May 2024)
 - Thesis title: The in vivo effects of acidic conditions on bone quality and function
 - Sobhan Katebifar (June 2022-Current)
 - Project: Examining the effect of dentinogenesis imperfecta type I on the dentin-enamel junction.
- Primary Advisor for Young Innovative Investigator (YIIP) Master’s program
 - Kennedy Drake (Sept 2023-Current)
 - Project: Predicting the Mechanical Properties of Biomimetic Apatite Crystals Due to Co and Cr Ion Substitutions
- Rotation Advisor for Biomedical Science PhD students at UConn Health
 - Kai Clarke (Jan 2023-May 2023)
 - Project: Measuring compositional gradients across the dentin-enamel junction of mice with dentinogenesis imperfecta.
 - Iris Nakashima (Aug 2019-Dec 2019)
 - Project: Determining the histological consequences of acidosis on bone cellular behavior.
- Primary Advisor for Medical and Dental Research Students
 - Nora Akila (June 2023-Current)
 - Project: Determining the mechanical properties of the dentin enamel junction in teeth with dentinogenesis imperfecta
 - Kathryn Kwochka (June 2023-Current)
 - Project: Measuring the effect of dentinogenesis imperfecta on compositional gradients of the DEJ in molars.
 - Michael Truhlar (June 2022-Current)
 - Project: Measured compositional gradients across the dentin-enamel junction
 - David Cruzate (June 2022- Aug 2022)
 - Project: Developed a histological technique for identifying collagen IV and VII at the dentin-enamel junction
 - Kat Pecerrillo (May 2021-Aug 2021)
 - Project: Examined the effect of high salivary Na and K on the composition of tooth-like apatites
 - Jay Dalal (May 2021-Aug 2021)
 - Project: Examined the efficacy of dental sensitivity treatments on the permeability of dentin
 - Saparja Nag (June 2019-Jan 2021)
 - Project: Measured the effect of acidosis on the composition of supraspinatus enthesis tissues and developed a novel method of

mechanical testing the supraspinatus-humerus complex. Author in publication #45

- Current Position: Hospital Resident at Yale School of Medicine
- o Mikayla Moynahan (June 2018-Jan 2021)
 - Project: Measured the effect of xerostomia mouthwashes on the composition on tooth-like apatites. Author on multiple conference presentations and first author of publication #33.
 - Current position: Pediatric Dental Resident at the Danbury Pediatric Health Center

II. Residents Last Five Years

- Anusha Vaddi, Masters in Dental Radiology (Dec 2020-Current)
 - o Thesis title: "Comparative evaluation of dental hard tissues & bone graft materials in Raman Spectroscopy & Cone Beam CT – An ex vivo study"
 - o First Author on publication #40
 - o Faculty at Virginia Commonwealth University as of July 2022

III. Undergraduates Last Five Years

- Michael Nohaj (UConn, Aug 2023-Current)
 - o Project: Effect of sexual dimorphism on femur composition
- Caroline Flanagan (UConn, Jun 2023-Current)
 - o Project: Examining the effects of Carbonate location on bone-like mineral properties
- Sydney Whittaker (UConn, Jun 2022-Current)
 - o Project: Examining the effects of paralysis on the structure and mechanics of the supraspinatus enthesis.
- Tyler Grubelich (Dartmouth, Jun 2023-Aug 2023)
 - o Project: Creating apatites with Cr and Co substitutions
- Christina Fares (Brandeis, Jun 2023-Aug 2023)
 - o Examining the biological consequences of acidosis on bone
- Trey Doktorski (UConn, Aug 2022-May 2023)
 - o Project: Characterized the effects of carbonate location on biomimetic bone mineral composition and structure.
 - o Current Position: Test Engineer at Medtronic in the surgical robotics unit
- Bradley Rosenberg (UConn, June 2022-May 2023)
 - o Project: Measuring density gradients across the dentin-enamel junction using microcomputed tomography.
 - o Current Position: Dental Student at UConn Health Starting in Aug 2023
- Isabelle DeBruyker (UConn, Jan 2022-May 2023)
 - o Project: Examining the effect of alendronate on rescuing the supraspinatus enthesis structure and mechanics during unloading. Author on publication #45.
 - o Current Position: Undergraduate student at Georgia Tech
- Margaret Easson (UConn, Jan 2021-July 2022)
 - o Project: Examining the effect of reduced acid on bone composition and mechanics. Author on publications #41 and 42.
 - o Current Position: PhD Candidate in BME at NC State
- Nayara Zainadine (UConn, May 2021-Mar 2022)
 - o Project: Examining the effect of bicarbonate administration on mouse bone health.
 - o Current Position: Data Analyst at Stanley Black & Decker
- Ashley Nelson (UConn, May 2020-May 2022)

- o Project: Examining the effect of Acidosis on the supraspinatus enthesis composition. Author on publication #45.
 - o Current Position: Test Engineer at Inline Plastics
- Ron Abraham (UConn, May 2019-June 2020)
 - o Project: Measuring the effect of acidosis on the bone internal composition. Author on publications #29 & 32.
 - o Current position: Medical Student at LECOM Bradenton
- Anthony D'Angio (UConn, Aug 2019-June 2020)
 - o Project: Establishing a standard curve for bone mineral carbonate content Raman analysis
 - o Current Position: Test Engineer at Medtronic in the surgical robotics unit
- Jay Dalal (UConn, Aug 2019-June 2020)
 - o Project: Looking at the effect of acidosis on bone mineralization.
 - o Current Position: Dental Student at UConn Health
- Katya Morozov (UConn, June 2018-May 2019)
 - o Project: Looking at the effects of Acute Acidosis on the structure and mechanics of the supraspinatus enthesis. Author on publication #42.
 - o Current Position: Project Manager at Philips
- Masashi Azuma (UConn, Oct 2017-June 2019)
 - o Project: Determining the effects of cyclic loading on the mineralization of decellularized and demineralized bone matrices. Author on publication #32.
 - o Current Position: Medical Student at Lewis Katz School of Medicine

IV. High School Students Last Five Years

- Faryal Akbar (Amity High School, Dec 2021-May 2022)
 - o Project: Examining the effect of soda drinking on enamel composition. Second place winner of the CT-STEM Science Fair.
- Angela Sadlowski (Farmington High School, Jan 2021-Aug 2021)
 - o Project: Examined osteoclast growth on bone-mineral discs with varying compositions.
 - o Current position: Undergraduate Student in BME at Johns Hopkins