

Andrew Gerald Baruth, Ph.D.

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Degrees

- Ph.D. Physics, **University of Nebraska–Lincoln** (5/09)
Dissertation Adviser: Prof. Shireen Adenwalla
Dissertation Title: *Exchange Coupling at Cobalt/ Nickel Oxide Interfaces*
- B.S. Physics, with honors (*cum laude*), **Doane College, Crete, Nebraska** (5/03)
Thesis Advisers: Profs. Christopher Wentworth and Mark Plano Clark
Thesis Title: *The Effects of Web-based Instructional Tools on Physics Education*

Appointments

- Assistant Professor of Physics, Creighton University* (7/12 – present)
- Postdoctoral Research Associate*, Profs. Chris Leighton (Distinguished McKnight University Endowed Professor of Chemical Engineering and Materials Science) and Marc Hillmyer (Distinguished McKnight University Endowed Professor of Chemistry), **University of Minnesota–Twin Cities** (7/09 – 6/12)
- Graduate Research Assistant*, Prof. Shireen Adenwalla (Associate Professor of Physics), **University of Nebraska–Lincoln** (1/04 – 5/09)
- Graduate Teaching Assistant*, Physics Dept., **University of Nebraska–Lincoln** (1/03 – 5/05)
- Undergraduate Research Assistant*, Profs. Christopher Wentworth (Professor of Physics) and Mark Plano Clark (Associate Professor of Physics), **Doane College** (6/01 – 5/04)

Honors and Awards

- 2015 Featured Alumnus, Nebraska Center for Materials and Nanoscience
2015 Best Poster in the Basic Sciences, Creighton University Research Day
2015 Best Poster Award Finalist, APS March Meeting
2014 Nebraska EPSCoR FIRST Award
2014 Delta Zeta Teacher of the Week
2011 Featured Alumnus, Doane College
2010 *Success Strategies for Emerging Faculty* invitation, University of Delaware
2010 Best Poster Award, Magnetism and Magnetic Materials Conference
2007 Sigma Xi Graduate Student Research Prize, University of Nebraska–Lincoln
2007 Sigma Xi Graduate Student Research Prize, University of Nebraska–Lincoln
2004 Graduate Teaching Assistant Award, University of Nebraska–Lincoln
2000 Golden Leaf Award, “On-air Personality of the Year”, KDNE Radio

Professional Activities and Associations

- 2014+ Creighton University Energy Club – Faculty Sponsor
2013+ Advisory Board – Nebraskans for Solar (non-profit)
2013+ Sigma Pi Sigma (physics honor society), member
2012 Session Chair for the American Physical Society’s National Meeting
2010 Session Chair for 55th Annual Magnetism and Magnetic Materials Conference

- 2009+ Referee for the following journals: Applied Physics Letters, Journal of Applied Physics, Journal of Physics: Condensed Matter, Journal of Magnetism and Magnetic Materials, ACS Macromolecules, ACS Applied Materials & Interfaces, Journal of Vacuum Science and Technology, and IEEE, Transactions on Magnetism
- 2005+ American Physical Society, member

Research Support

--Pending

NSF MRI: Acquisition of a Multi-Purpose X-ray Diffractometer for Structural Characterization (National Science Foundation, \$426,000 direct, 09/01/16 – 09/01/18, P.I. A. G. Baruth). Proposal to acquire a versatile, novice-friendly X-ray Diffraction (XRD) facility to provide critical information about the structural properties of materials at the atomic, molecular, and nanometer scale for a variety of disciplines, including physics and chemistry, as well as material, energy, biomedical, and pharmacy sciences. Specific measurement capabilities of the XRD system will include small and wide-angle XRD, reflectometry, microdiffraction and powder diffraction, all with the added capability of temperature control. These included XRD capabilities will be especially valuable to our emerging research programs pertaining to (i) earth-abundant photovoltaic materials, (ii) self-assembled block polymer thin films, (iii) drug-polymer complexes for drug delivery, (iv) clustering of simple sugars in solution, and (v) structural characterization of synthetic structures.

--Funded

Influence of Clinically Relevant CAD/CAM Zirconia Abutment Modification on Gingival Fibroblast Viability, Adhesion, and Normal Proliferation (Creighton University: Center for Undergraduate Research and Scholarship, \$1000 direct, 06/01/16 – 6/1/17, P.I. A.G Baruth). The award provides materials to study Zirconia surfaces following proprietary polishing protocols.

Honors Program Undergraduate Research Scholarship (Creighton, \$5250 direct, 06/01/16 – 9/1/16, P.I. A.G Baruth). The award provides a summer stipend for one student, Nicholas Fischer, and advisor.

Nebraska Environmental Trust Fund: Impact 1.7 Million: Zoo Produces Solar Electricity for the Public to Experience (Nebraska Environmental Trust, \$140,614 direct, 4/1/2016 – 6/1/2017, P.I. Henry Doorly Zoo & Aquarium, A.G. Baruth, Partner). Omaha's Henry Doorly Zoo & Aquarium proposes to install a solar photovoltaic (PV) system to demonstrate renewable electricity production for its 1.7 million visitors per year. The Zoo's envisioned solar PV system will be unique because it will provide a hands-on interactive kiosk for the 1.7 million visitors to better understand its extensive environmental, health and financial benefits. We will provide information and planning for kiosks, solar energy curriculum for summer camps and after school programming, as well as volunteer in educational capacities.

Expansion of Creighton University Energy Technology Program's Commitment to Renewable Energies (Omaha Public Power District, \$300,000 direct, 09/01/14 – 09/01/19, P.I. A.G. Baruth). This funding is for 1) investment in new photovoltaic research and analysis equipment for A. Baruth, 2) repair and replacement/upgrading of current Windspire installations on Creighton's campus, 3) renewable energy and energy conservation related public outreach, and 4) research stipends for Energy Technology Program students.

--Completed

Student Fellowships 2015/2016 Nelson (NASA Nebraska Space Grant & EPSCoR, \$3000 direct, 09/01/15 – 3/31/16, P.I. A.G Baruth). The award provides annual stipend for one student, Gunnar Nelson.

The Material Science of Dental Restoration Materials: Forming Collaborations between the College of Arts and Sciences and the School of Dentistry (Dr. George F. Haddix President's Faculty Research Fund, Creighton University, \$15,000 direct, 02/15/14-2/15/16, P.I. A.G. Baruth). The study will focus on dental restorative materials, a class of fabricated materials specifically designed for restoring tooth form and function. Several key issues exist, primarily in the areas of biocompatibility and physical wear, which must be fully addressed to evaluate their efficacy in a clinical setting. We propose that the establishment of new collaborations between the College of Arts and Sciences and the School of Dentistry, which will enhance the study of dental materials and provide a meaningful experience for undergraduate students interested in pre-professional programming.

Ferlic Undergraduate Research Scholarship (Creighton, \$5000 direct, 06/01/15 – 9/1/15, P.I. A.G Baruth). The award provides a summer stipend for one student, Gunnar Nelson, and advisor.

Directed Self-Assembly of Block Polymer Thin Films Via Solvent Vapor Annealing (Nebraska EPSCoR, \$20,000 direct, \$20,847 indirect, 01/01/15 – 09/01/15, P.I. A.G. Baruth). This proposal focuses on the systematic investigation of the solvent-assisted self-assembly process in block polymer thin films. We plan a series of experimental investigations in order to elucidate and control the parameters most critical to the directed self-assembly of block polymer thin films.

Student Fellowships 2014/2015 Yanchilin & Gnabasik (NASA Nebraska Space Grant & EPSCoR, \$4000 direct, 09/01/14 – 3/31/15, P.I. A.G Baruth). The award provides annual stipends for two students, Ryan Gnabasik and Anton Yanchilin.

Omaha Youth's Path to Passive Solar (Nebraska Academy of Sciences and the Nebraska Environmental Trust, \$3,000 direct, 06/01/14 – 07/01/14 , P.I. A.G. Baruth). This is to help fund a three-week camp that will meet for three hours a day and focus on the design, installation and maintenance of convection and passive solar heating systems. The camp is open to all Nebraska youth and funding will help subsidize camp costs. Students are able to receive college credit through Creighton Summer Sessions under course number ERG 132 at an additional cost.

Collaborative Research: Understanding and Supporting Student Intrinsic Motivation in STEM Courses (NSF TUES Type 2 Grant, 10/13-10/15, P.I. Jonathon Stolk, Role: Faculty Partner). Prior and emerging educational research suggests that understanding students' motivational relationship to their learning experience could be a crucial insight necessary for a systemic shift toward high-level outcomes. This study will facilitate a deeper understanding of student motivation through analysis of motivation research data from undergraduate classroom contexts, and by coupling context-specific research data with course design tools that enable targeted instructor action to enhance intrinsic drive.

Solvent-induced ordering of self-assembled block copolymer thin films (Creighton University Graduate School, \$4800 direct, 07/01/13-9/1/13, P.I. A.G. Baruth). The study will focus on the construction and testing of an advanced solvent vapor reaction chamber for block copolymer thin films. Such materials naturally self-assemble into a wide-range of morphologies (*i.e.*, shapes); however, without direction, this order has little periodicity at large lateral length scales. The solvent-induced, directed ordering of self-assembled block copolymer thin films

will allow access to these novel periodic nanostructures with unprecedented control and precision.

--Not Funded

NSF MRI: Acquisition of a Multi-Purpose X-ray Diffractometer for Structural Characterization (National Science Foundation, \$426,000 direct, 09/01/15 – 09/01/18, P.I. A. G. Baruth).

Proposal to acquire a versatile, novice-friendly X-ray Diffraction (XRD) facility to provide critical information about the structural properties of materials at the atomic, molecular, and nanometer scale for a variety of disciplines, including physics and chemistry, as well as material, energy, biomedical, and pharmacy sciences. Specific measurement capabilities of the XRD system will include small and wide-angle XRD, reflectometry, microdiffraction and powder diffraction, all with the added capability of temperature control. These included XRD capabilities will be especially valuable to our emerging research programs pertaining to (i) earth-abundant photovoltaic materials, (ii) self-assembled block polymer thin films, (iii) drug-polymer complexes for drug delivery, (iv) clustering of simple sugars in solution, and (v) structural characterization of synthetic structures.

NSF CAREER: Directed Self-Assembly of Block Polymer Thin Films via Solvent Vapor Annealing (National Science Foundation, \$326,311 direct, \$137,097 indirect, 01/01/16 – 01/01/20, P.I. A. G. Baruth). The proposed research addresses a broad, long-term strategy to elucidate the key mechanisms involved in the solvent-assisted self-assembly of block polymer thin films and relating them to well-known properties of thermal annealing of single-component solids. In addition, the generality of this analogy to multiple block polymer systems with various polymer-polymer interaction parameters, surface energies and architectures is of supreme interest. Ultimately, identifying whether these analogs can be applied to highly immiscible blocks (providing the smallest potential feature size) is critical for the creation of any standardized nanolithography production scheme, which remains absent in this field.

Publications

In preparation

1. A. Baruth, G. Nelson, C. Drapes, R. Gnabasiak, M. Grant. Application Note: Development of a High-Precision Solvent Vapor Annealing Chamber for Block Polymer Thin Films. Submitted to ACS Macromolecules.
2. C. Roselyn Cerutis, C. Wilcox, N. Fischer, R. Gnabasiak and A. Baruth. The Re-use of Dental Healing Abutments.

Refereed Publications

Submitted after arriving at Creighton University

1. A. Baruth. Isothermal tuning of magnetic coercivity in NiFe/NiO/[Co/Pt] heterostructures with orthogonal easy axes. *J. Appl Phys.* **118**,093901 (2015).
2. Chun-Hao Lin, Srinivas Polisetty, Liam O'Brien, A. Baruth, Marc A. Hillmyer, C. Leighton, Wayne L. Gladfelter. Size-tuned ZnO Nanocrucible Arrays for Magnetic Nanodot Synthesis via ALD-assisted Block Polymer Lithography. *ACS Nano* **9**, 1379 (2015).
3. A. Baruth, Myungeun Seo, Chun Hao Lin, Kern Walster, Arjun Shankar, Marc A. Hillmyer, and C. Leighton, Optimization of long-range order in solvent vapor annealed poly(styrene)-block-poly(lactide) thin films for nanolithography. *ACS Appl. Mat. & Int.* **16**, 13770 (2014).

4. X. Zhang, M. Manno, **A. Baruth**, M. Johnson, E. Aidyl and C. Leighton. Crossover from Nanoscopic Intergranular Hopping to Conventional Charge Transport in Pyrite Thin Films. *ACS Nano* **7**, 2781 (2013).
Submitted prior to arriving at Creighton University
5. **A. Baruth**, Marc D. Rodwogin, C. Leighton and Marc A. Hillmyer. Nanoscale rings from silicon-containing triblock terpolymers. *ACS Appl. Mat. & Int.* **4**, 3550 (2012).
6. **A. Baruth**, M. Manno, A. Shankar, D. Narasimhan and C. Leighton. Reactive sputtering of transition metal disulfide thin films: Structure, magnetism and transport. *J. Appl. Phys.* **112**, 054328 (2012).
7. **A. Baruth**, Marc D. Rodwogin, A. Shankar, M.J. Erickson, Marc A. Hillmyer and C. Leighton. Non-lift-off Block Copolymer Lithography of 25 nm Magnetic Nanodot Arrays. *ACS Appl. Mat. & Int.* **3**, 3472 (2011).
8. **A. Baruth** and S. Adenwalla. Domain size and structure in exchange coupled [Co/Pt]/NiO/[Co/Pt] multilayers. *J. Phys. Cond. Mat.* **23**, 376002 (2011).
9. S. Davis, **A. Baruth**, S. Adenwalla. Magnetization dynamics triggered by surface acoustic waves. *Appl. Phys. Lett* **97**, 232507 (2010).
10. A. Mardana, Mengjun Bai, **A. Baruth**, Stephen Ducharme, S. Adenwalla. Magneto-Electric Effects in Ferromagnetic Cobalt / Ferroelectric Copolymer Multilayer Films. *Appl. Phys. Lett.* **97**, 112904 (2010).
11. **A. Baruth** and S. Adenwalla. Temperature and set field dependence of exchange bias training effects in Co/NiO/[Co/Pt] heterostructures with orthogonal easy axes. *J. Magn. Magn. Mater.* **322**, 2051 (2010).
12. **A. Baruth** and S. Adenwalla. Enhanced blocking temperature and isothermal control of hysteresis loop shifts in Co/NiO/[Co/Pt] heterostructures with orthogonal easy axes. *Phys. Rev. B* **78**, 174407 (2008).
13. **A. Baruth**, L. Yuan, J. D. Burton, K. Janicka, E.Y. Tsymbal, S.H. Liou and S. Adenwalla. Domain overlap in antiferromagnetically coupled [Co/Pt]/NiO/[Co/Pt] multilayers. *Appl. Phys. Lett.* **89**, 202505 (2006).
14. **A. Baruth**, D.J. Keavney, J. D. Burton, K. Janicka, E.Y. Tsymbal, L. Yuan, S.H. Liou and S. Adenwalla. Origin of the interlayer exchange coupling in [Co/Pt]/NiO/[Co/Pt] multilayers studied with XAS, XMCD, and micromagnetic modeling. *Phys. Rev. B* **74**, 054419 (2006).

Conference Proceedings

1. **A. Baruth** and C.D. Wentworth. Creating Interactive Physics Media with Flash and Video. *127th Meeting of the American Association of Physics Teachers* (2003).
2. **A. Baruth** and C.D. Wentworth. Developing a Web-based Tutorial System for Physics Education. *35th Annual Midwest Instruction and Computing Symposium* (2002).

Selected Presentations

1. Nicholas Fischer, Toshiki Takamizawa, Wayne Barkmeier, **Andrew Baruth**. Comparison of Self-Etch Adhesives with Atomic Force Microscopy and Optical Profilometry. Contributed, Nebraska Academy of Sciences Annual Meeting, Lincoln, NE (2016).

**Awarded “Outstanding Undergraduate Research in Biomedical Sciences Award” from the Nebraska Medical Center.

2. Meagan Grant and **Andrew Baruth**. Solvent Vapor Annealing. Contributed, Nebraska Academy of Sciences Annual Meeting, Lincoln, NE (2016)
3. Chloe Drapes, Gunnar Nelson, Meagan Grant, Jeffrey Wong, and **A. Baruth**. The Role of Ultra-Fast Solvent Evaporation on the Directed Self Assembly of Block Polymer Thin Films. Contributed, Nebraska Academy of Sciences Annual Meeting, Lincoln, NE (2016)
4. G. Nelson, C. Drapes, M. Grant, J. Wong, **A. Baruth**. Towards ultra-fast solvent evaporation, the development of a computer controlled solvent vapor annealing chamber. Contributed, Nebraska Academy of Sciences Annual Meeting, Lincoln, NE (2016)
5. Nicholas Fischer, **Andrew Baruth**, Toshiki Takamizawa, Wayne Barkmeier. Comparing Self-Etch Adhesives with Atomic Force Microscopy and Optical Profilometry. Contributed, American Association of Dental Research Annual Meeting, Los Angeles, CA. (2016)
6. **A. Baruth**, G. Nelson, C. Drapes, J. Wong, M. Grant. Effects of ultra-fast solvent evaporation in solvent vapor annealed cylinder-forming block polymer thin films. Contributed, March Meeting of the American Physical Society, Baltimore, MD. (2016)
7. G. Nelson, J. Wong, C. Drapes, M. Grant, **A. Baruth**. Towards ultra-fast solvent evaporation, the development of a computer controlled solvent vapor annealing chamber. Contributed, March Meeting of the American Physical Society, Baltimore, MD. (2016)
8. C. Drapes, G. Nelson, M. Grant, J. Wong, **A. Baruth**. The role of ultra-fast solvent evaporation on the directed self-assembly of block polymer thin films. Contributed, March Meeting of the American Physical Society, Baltimore, MD. (2016)
9. **Andrew Baruth**. States of Matter: How Solid is a Solid?. Invited, Jesuit Academy, Omaha, NE (2015)
10. **Andrew Baruth**. An Engineer, a Material Scientist or a Physicist? How I got here. Invited. Doane College, Crete, NE (2015)
11. Gunnar Nelson and **Andrew Baruth**. Time Dependence of Self-Assembly in Block Polymer Thin Films. Invited. 2015 Dr. Randolph M. and Teresa Kolars Ferlic Research Scholar Symposium, Creighton University (2015)
12. Ryan Gnabasik, Gunnar Nelson, Chloe Drapes, and **Andrew Baruth**. Reproducibility Characterization of a Climate-Controlled Solvent Vapor Annealing Chamber in Directed Self-Assembly of Block Polymer Thin Films for Use in Long-Range Human Spaceflight. Contributed, Nebraska Academy of Sciences Annual Meeting, Lincoln, NE (2015)
13. Anton G. Yanchilin, Erin Cheese, and **Andrew G. Baruth**. Synthesis of Copper Sulfide Thin Films for Photovoltaic Applications. Contributed, Nebraska Academy of Sciences Annual Meeting, Lincoln, NE (2015)
14. Gunnar Nelson, Ryan Gnabasik, and **Andrew Baruth**. Linking Solvent Vapor and Thermal Annealing by Analyzing Time-dependent Crystallization Rates of Polystyrene-block-Polylactide Thin Films. Contributed, Nebraska Academy of Sciences Annual Meeting, Lincoln, NE (2015)
15. **A. Baruth**. Isothermal tuning of magnetic coercivity in NiFe/NiO/[Co/Pt] heterostructures with orthogonal easy axes. Contributed, March Meeting of the American Physical Society (2015)
16. R. Gnabasik, G. Nelson, C. Drapes, **A. Baruth**. Investigation of solvent annealing time dependence on morphology formation in polystyrene-block-poly lactide thin films.

- Contributed, March Meeting of the American Physical Society (2015) ****Finalist for Best Poster****
17. **A. Baruth**. The Hitchhiker's Guide to Nanotechnology and Superparamagnetism: Potential Relevance in Neuroscience Research. Invited, Creighton University Neuroscience Journal Club (Sept 12, 2014)
 18. **A. Baruth**. Optimization of Long-Range Order in Solvent-Annealed Polystyrene-Block-Polylactide Block Polymer Thin Films for Nanolithography. Contributed, Nebraska Academy of Sciences Annual Meeting, Lincoln, NE (April 11, 2014)
 19. Erin Cheese, Brianna Baca, Anton Yanchilin, and **Andrew Baruth**. Synthesis of Copper Monosulfide Thin Films by Ex-Situ Sulfidation. Contributed, Nebraska Academy of Sciences Annual Meeting, Lincoln, NE (April 11, 2014)
 20. Ryan Gnabasik and **Andrew Baruth**. Design, Construction, And Testing A Purpose-Built Climatecontrolled Solvent Vapor Annealing Chamber For Guided Selfassembly Of Block Polymer Thin Films. Contributed, Nebraska Academy of Sciences Annual Meeting, Lincoln, NE (April 11, 2014)
 21. Wayne L. Gladfelter, Chun-Hao Lin, Srinivas Polisetty, **Andrew G. Baruth**, Marc A. Hillmyer, Christopher Leighton. Using Zinc Oxide ALD to Control Pore Diameter on Poly(styrene) Templates. Contributed, The AVS Topical Conference on Atomic Layer Deposition 2014 (ALD 2014). Kyoto, Japan.
 22. **A. Baruth**, M.Seo, C.H. Lin, K. Walster, A. Shankar, M.A. Hillmyer and C. Leighton. Optimization of long-range order in solvent-annealed polystyrene-*b*-polylactide block polymer thin films for nanolithography. Contributed, March Meeting of the American Physical Society (2014)
 23. Ryan Gnabasik, Rustin Haase, and **A. Baruth**. Design, construction, and testing a purpose-built climate-controlled solvent vapor annealing chamber for guided self-assembly of block polymer thin films. Contributed, March Meeting of the American Physical Society (2014)
 24. **A. Baruth**, Directed self-assembly: A new frontier for nanolithography. Invited, University of Nebraska, Physics Department (2013). Omaha, NE
 25. **A. Baruth**, The Creighton Energy Technology Program: Case Study on Solar Energy Education and Urban Installation. Invited, Sixth Annual Nebraska Wind Conference (2013). Lincoln, NE
 26. **Andrew Baruth**, Xin Zhang, Michael Manno, B. Selin Tosun, Rebekah Feist, Melissa Johnson, Chris Leighton, Uwe Kortshagen, Steve Campbell, Andre Mkhoyan, and Eray S. Aydil, Plasma Synthesis of Photovoltaic Materials. Invited, presented by my colleague Eray S. Aydil, I was the first author. Symposium UU: Plasma and Low-Energy Ion-Beam-assisted Processing and Synthesis of Energy-related Materials. 2013 MRS Spring Meeting & Exhibit. April 1-5, 2013. San Francisco, CA
 27. **A. Baruth**, M. Manno, A. Shankar, D. Narasimhan and C. Leighton. Reactive sputtering of transition metal disulfide thin films: Structure, magnetism and electronic transport. Contributed, March Meeting of the American Physical Society (2012)
 28. **A. Baruth**, Marc D. Rodwogin, A. Shankar, M.J. Erickson, Marc A. Hillmyer and C. Leighton. Non-lift-off Block Copolymer Lithography of 25 nm Magnetic Nanodot Arrays. Contributed, March Meeting of the American Physical Society (2012)

29. **A. Baruth**, M.D. Rodwogin, A. Shankar, M.A. Torija, M.J. Erickson, M.A. Hillmyer and C. Leighton. Non-liftoff block copolymer nanolithography of magnetic nanodot arrays.
Contributed, March Meeting of the American Physical Society (2011)
30. **A. Baruth**. Application of block copolymer patterning to magnetic materials. (2010-12)
Invited, IEEE Magnetics Society
Invited, Seagate Technology
Invited, Otterbein University, Physics Dept. Colloquia
Invited, Augustana College, Physics Dept. Colloquia
Invited, Creighton University, Physics Dept. Colloquia
Invited, 7th Annual Minnesota Nanotechnology Workshop
Invited, University of Minnesota, ECE Dept. Magnetics Seminar
Invited, Augsburg College, Physics Dept. Colloquia
Invited, North Dakota State University–Fargo, Physics Dept. Colloquia
Invited, Nebraska Center for Materials and Nanoscience Seminar Series
Invited, Fifth Upper Midwest MRSEC Symposium
Invited, *Success Strategies for Emerging Faculty*, University of Delaware
Invited, Minnesota State University–Mankato, Physics Dept. Colloquia
31. **A. Baruth**, M.D. Rodwogin, A. Shankar, M.J. Erickson, M.A. Hillmyer and C. Leighton. A novel non-liftoff approach to block copolymer patterning of magnetic materials.
Contributed, 55th Conference on Magnetism and Magnetic Materials (2010)
32. **A. Baruth**, S.K. Davis and S. Adenwalla. Excitation and Study of Magnetization Dynamics in Patterned Thin Films Using Surface Acoustic Waves.
Contributed, March Meeting of the American Physical Society (2009)
33. **A. Baruth**. Exchange Coupling at Co/NiO Interfaces: The Origin of Interlayer Exchange Coupling.
Invited, University of Minnesota–Twin Cities, MRSEC Seminar (2009)
34. **A. Baruth**, L. Yuan, J. D. Burton, K. Janicka, E.Y. Tsymbal, S.H. Liou, and S. Adenwalla. Domain overlap in antiferromagnetically coupled [Co/Pt]/NiO/[Co/Pt] multilayers.
Contributed, 52nd Conference on Magnetism and Magnetic Materials (2007)
Contributed, March Meeting of the American Physical Society (2007)
35. **A. Baruth** and S. Adenwalla. Magnetic coupling and training effects in Co/NiO/[Co/Pt] structures with orthogonal easy axes.
Contributed, March Meeting of the American Physical Society (2007)
36. **A. Baruth**, S.H. Liou, D.J. Keavney, and S. Adenwalla. Effects of coupling on domain structure of [Pt(6Å)/Co(4Å)]₃/NiO(t_{NiO})/[Co(4Å)/Pt(6 Å)]₃ multilayers with oscillatory coupling.
Contributed, March Meeting of the American Physical Society (2006)
37. **A. Baruth**, D.J. Keavney, and S. Adenwalla. Oscillatory Coupled Multilayers with a NiO interlayer.
Invited Guest, Advanced Photon Source, Argonne National Laboratory (2005)
38. **A. Baruth**, S. Adenwalla, and D.J. Keavney. XMCD studies of antiferromagnetically coupled Co/Pt Multilayers.
Contributed, March Meeting of the American Physical Society (2005)
Contributed, 49th Conference on Magnetism and Magnetic Materials (2004)
39. C. Wentworth and **A. Baruth**. Creating Interactive Physics Media with Flash and Video.
Contributed, 127th American Association of Physics Teachers Meeting (2004)

40. C. Wentworth, M.W. Plano Clark, **A. Baruth**, and B. Fulton. Using Ultrasound Imaging to Motivate Physics Learning as Part of the Humanized Physics Project. Contributed, 126th American Association of Physics Teachers Meeting (2003)
41. **A. Baruth**. Flash-VidDat: A Macromedia Flash Application for Physics Video Analysis on the Web. Contributed, 126th American Association of Physics Teachers Meeting (2003)
42. **A. Baruth** and C. Wentworth. Developing a Web-based Tutorial System for Physics Education. Contributed, 35th Midwest Instruction and Computing Symposium (2002)

Media Contributions

1. Old landfill eyed as solar farm. Eugene Curtin, Bellevue Leader (December 28, 2015) http://www.omaha.com/sarpy/bellevue/old-landfill-eyed-as-solar-farm/article_686a3294-01c6-5f5d-9afb-bf9a0dfa8ad2.html
2. For capstone class, Creighton students analyze energy efficiency of Omaha Archdiocese schools. Alia Conley, Omaha World Herald (November 11, 2015). http://www.omaha.com/news/education/for-capstone-class-creighton-students-analyze-energy-efficiency-of-omaha/article_67b78682-a71a-5511-87f6-54b80d13f675.html?mode=jqm
3. Pope would already be proud of us, utilities say. Russell Hubbard, Omaha World Herald (June 20, 2015)
4. Wind, solar power could supply 75 percent of Nebraska's needs, advocates say. Russell Hubbard, Omaha World Herald (February 19, 2015) http://www.omaha.com/money/wind-solar-power-could-supply-percent-of-nebraska-s-needs/article_00ad268b-718d-545c-a745-40b0949382ac.html
http://www.omaha.com/eedition/sunrise/articles/pope-would-already-be-proud-of-us-utilities-say/article_c0c7feff-b3bf-57a9-946d-40fee26e668c.html?mode=jqm
5. CU, UNO offer right climate for sustainability. Leslie Reed, Omaha World Herald (May 6, 2013). <http://www.omaha.com/article/20130506/NEWS/705069926/1687>
Course (ERG 251) was featured on the front page of the Omaha World Herald.

Courses Taught

Semester	Course Number	Course Title
Spring 16	ERG 521	Introduction to Photovoltaic Materials
Fall 15	PHY 201	General Physics for the Life Sciences I
Fall 15	ERG 131	Installation and Maintenance of Photovoltaic Systems
Fall 15	ERG 520	Introduction to Solar Energy
Fall 15	RSP 101	Introduction to the Culture of Collegiate Life
Spring 15	PHY 491	Physics Seminar
Spring 15	PHY 595	Introduction to Material Science
Spring 15	ERG 521	Introduction to Photovoltaic Materials
Fall 14	PHY 201	General Physics for the Life Sciences I
Fall 14	ERG 131	Installation and Maintenance of Photovoltaic Systems
Fall 14	ERG 520	Introduction to Solar Energy
Spring 14	PHY 491	Physics Seminar

Spring 14	ERG 251	History and Material Science of the Modern World
Spring 14	ERG 521	Introduction to Photovoltaic Materials
Fall 13	PHY 591	Seminar in Engineering
Fall 13	ERG 131	Installation and Maintenance of Photovoltaic Systems
Fall 13	ERG 321	Introduction to Solar Energy
Fall 13	RSP 101	Introduction to the Culture of Collegiate Life
Summer 13	ERG 132	Convection and Passive Solar Energy Systems
Spring 13	PHY 211	General Physics I
Spring 13	ERG 251	History and Material Science of the Modern World
Fall 2012	PHY 212	General Physics II
Fall 2012	PHY 212 LM	General Physics: Honor's Lab
Fall 2012	PHY 591	Seminar in Engineering

Mentoring of Undergraduate and Graduate Research Students

Since arriving at Creighton in 2012, I have personally mentored 1 high school student, 27 undergraduate and 3 graduate students through my research program (see table below). These students have worked with me in all aspects of equipment design, data collection and analysis. A few select students have been invited to aid in manuscript preparation or public presentations.

Dr. Baruth's Materials Research Laboratory Research Students

Undergraduate (UG) Students

	Name	Major	Years	Project	Last Known Institution
1	Hannah Mullally	BIO	2012	Cryostat Mount	
2	Molly Berringer	H.S.	2012	Cryostat Mount	
3	Daniel Dean	ERG/BIO	2012	Cryostat Mount and X-ray Fluorescence	
4	Erin Cheese	ERG/PHY	2013-15	Ex-situ Sulfidation	Junior Fellow, Department of Energy REU: K-State
5	Brianna Baca	ERG	2013-14	Ex-situ Sulfidation	Bluestem Energy Solutions
6	Ryan Gnabasik	ERG/PHY	2013-15	Solvent Annealing/ Dental Materials	University of Minnesota – Material Science REU: UC-Davis, Olin
7	Sam Rosol	ERG/ PHY	2013	Polymer Characterization	
8	Katherine Ostermann	PHY	2014	Dental Materials	Kiewit Building Group Services – Sustainability Coordinator
9	Anton Yanchillin	ERG	2014-15	Ex-situ Sulfidation	REU: Artic Shield, Johns Hopkins
10	Jason Rogers	PHY	2014	Hall Effect Instrument	United States Air Force
11	Gunnar Nelson	PHY	2014-15	Solvent Annealing	
12	Caroline Ladley	CHEM. E	2014	Ex-situ Sulfidation	Cornell University
13	Nicholas Fischer	BIO/ EVS	2014-15	Dental Materials	

14	Rachel Pham	CHM	2014	Dental Materials	
15	Koy Matthews	ERG	2014	Hall Effect Instrument	
16	Jake Yager	ERG	2014	External Quantum Efficiency Apparatus	
17	Ala'a Rayyan	ERG	2015	Ex-situ Sulfidation	REU: Iowa State
18	Karen Sass	PHY	2015	Ex-situ Sulfidation	Intern: Kiewit
19	Keelan Okazaki	ERG	2015	Dental Materials and Outreach	
20	Meagan Grant	ERG	2015	Solvent Annealing and Outreach	
21	Jeffery Wang	PHY	2015	Solvent Annealing	
22	Sierra Brown	ERG	2015	Outreach and LED efficiency	
23	Colin Thomas	ERG	2015	Outreach and LED efficiency	
24	Michael Watras	ERG	2015	Dental Materials, Solar Array, Outreach and LED efficiency	
25	John Sunderland	PHY	2016	Ex-Situ Sulfidation	
26	Christopher Landis	PHY	2016	LabView Control for Quantum Efficiency Testing	
27	Teresa Kooima	ERG	2016	Ex-Situ Sulfidation	
28	Will Jakubowski	ERG	2016	Solvent Annealing	

Graduate (M.S.) Students

	Name	Major	Years	Project	Last Known Institution
1	Rustin Haase	PHY	2012-2014	Solvent Annealing	
2	Mark Akubo, S.J.	PHY	2013-2015	Solvent Annealing	
3	Chloe Drapes	PHY	2015	Solvent Annealing	
4	Ben Marcussen	PHY	2016	Ex-Situ Sulfidation	

Service

University

Apr. 4, 2013 Brownell-Talbot Creighton Career Day, Assistant
May 2, 2013 Gave a tour to 40 Brazilian High School Students, International Admissions
Aug. 26, 2013 Lecture and Tour for visiting students from Tohoku University, Japan
July 31, 2013 Acquired 17 solar thermal panels (donated) from OPPD and facilitated their move to Creighton University
Nov 9, 2013 Completed solar siting for the Creighton Retreat Center in Griswold, IA – inspecting feasibility of an installation for summer 2014
Nov 9, 2013 Monitored the annual cleaning of the Burt Street solar panel array. This had been contracted out in the past, but this year I utilized students and campus facilities to perform the costly task.
Jan 28, 2014 Presented to High School Guidance Counselors on Energy Technology Program
Apr. 2, 2014 Brownell-Talbot Creighton Career Day, Assistant

Apr. 7, 2014 Breakfast for Admitted Students, Assistant
 Mar. 2014 Participated in the Creighton Calling initiative
 2014 Maintenance of Solar Installation was passed from University facilities to Energy Technology, I am taking the lead
 Aug 20, 2014 Monitored the annual cleaning of the Burt Street solar panel array. This had been contracted out in the past, but this year I utilized students and campus facilities to perform the costly task.
 Aug 22, 2014 Monitored electrical inspection of the Burt Street solar panel array.
 Aug 26, 2014 Lecture and Tour for visiting students from Tohoku University, Japan
 Oct 18, 2014 Acquired 40 high efficiency passive solar windows from a private donor (Dick Eurich), utilizing donated time from a local solar installer and Omaha North students, and facilitated their move to Creighton University
 Oct 31, 2014 Goldwater Application Reviewer
 2014-2015 Assisted with CU Sunday events
 Jan. 15, 2015 Meeting with Omaha Economic Development Corporation to discuss renewable energy strategies and energy auditing for North Omaha.
 Feb. 18, 2015 Press Teleconference for Renewable America
 April 14, 2015 Judge for Creighton Research Day (St. Albert's Day)
 April 28, 2015 Participated in the "CU Involvement in North Omaha Meeting," presented by Mission and Ministry, CCSJ and Government and Community Relations.
 Sept. 15, 2015 Meeting with Dean Mueller, OPPD Sustainability Director, to renew sponsorship
 Sept. 18, 2015 Met with Dan Smith (President of Electric Company of Omaha) and John Bourne (International Representative in the 11th District for IBEW) to discuss in-kind donations for work on solar installations. **Increased production on the 85 kW array on Burt street from 10-15 kW to FULL capacity, and made advancements on improving array communications**
 Oct. 14, 2015 Meeting with Tim Burke, OPPD President and CEO, to discuss partnership opportunities with Creighton
 Jan. 21, 2016 Met with Michael Howard of World-Cal to discuss the possible donation of more than \$800,000 worth of solar testing equipment from his company to Creighton.
 April 12, 2016 Judge for Creighton Research Day (St. Albert's Day)
 May 19, 2016 MAGIS Core Assessment Day, Participant

College

2012-2013 New Faculty Workshop, Attendee
 July 2013 Summer Energy Technology Camp (3 weeks), Organizer
 August 2013 Energy Technology Retreat for Incoming Freshman (1 week), Organizer
 2013-2014 RSP Advisor
 August 2014 Energy Technology Retreat for Incoming Freshman (1 week), Organizer
 2014 Honors Advisor, Katherine Osterman
 2015 Honors Advisor, Anton Yanchilin and Nicholas Fisher
 2015-2016 RSP Advisor
 May 14, 2015 Presents "States of Matter: How Solid is a Solid?" to the Jesuit Academy
 August 2015 Energy Technology Retreat for Incoming Freshman (1 week), Organizer
 May 4, 2016 Presents "How Tall can a LEGO Tower be Before it Crushes Itself?" to the Jesuit Academy

Department

July 25, 2013 Tour with Chinese visiting students interested in Creighton graduate school

2012-2013 Upper division laboratory revision committee, Attendee, Co-author, Co-contributor

2012-2016 Physics Department Meetings, Attendee, Time Czar and Minutes-taker du jour

2012-2016 Energy Technology Program Staff Meetings, Attendee (weekly)

2013-2014 Physics Advanced Lab Modules, Creator

2013-2016 Department/Program Liaison to Library for Physics and Energy Technology

2013-2016 Writer and grader for Qualification Exams for Master's Students

2013-2016 Thesis Committee member

2014-2015 Applied Physical Analysis Major Revision

2014-2015 Designated Core Course Proposal – Physics Seminar

2014+ Compile “Good News” for the Physics Department

2014+ Faculty Sponsor for Creighton University Energy Club

April 28, 2014 Omaha Chamber of Commerce Meeting, Represented CU

May 2, 2014 Energy Technology Industrial Advisory Meeting, Assistant

Oct 17, 2014 Energy Technology Industrial Advisory Meeting, Assistant

Nov 8, 2014 Jesuit Retreat for Physics Faculty

Nov 12-16, 2014 AAPT New Faculty Workshop in College Park, MD

2014+ Faculty Liaison to Radiation Safety

April 10, 2015 Energy Technology Industrial Advisory Meeting, Assistant

March 23, 2015 Led a public panel discussion on the Creighton University Energy Technology Program, sponsored by Nebraskans for Solar.

Oct. 7, 2015 Energy Technology Industrial Advisory Meeting, Assistant

Oct 8, 2015 CURAS Undergraduate Research Fair, Presenter

Oct. 9, 2015 Presented on Physics Graduate Program to Doane College, Crete, NE.

Oct. 13, 2015 Provided a job shadow for Nolan Roth

Apr. 26, 2016 Judge for Project Physics Lab Robotics Competition

May 8, 2016 Energy Technology Industrial Advisory Meeting, Assistant

Public

Dec. 15, 2012 First Lego League of Nebraska, LEGO Robot Design and Mechanical Judge

Feb. 16, 2013 Science in Scouting Day, Organizer, taught 10 year old boys the scientific method through a material science experiment, on the Creighton Campus, involving the testing of LEGO towers. They earned the Cub Scout science belt loop and pin.

2013-2015 Advisory Council, Nebraskans for Solar (non-profit)

July 8, 2014 Green CU Tour, Organizer

Oct 28, 2014 Nebraska Wind and Solar Conference Tour of Creighton, Organizer

Dec 11, 2014 Finalized a feasibility study for a 25 kW solar electric installation at the Siena/Francis House, presented to Siena/Francis, Nebraskans for Solar and Omaha Public Power District.

2014-2015 Participated in the AAPT Faculty Online Learning Community with weekly WebEx meetings amongst the cohort

2014-2015 Tiger Cub Leader and Cubmaster for Pack 266, Papillion, NE

2014-2015 Worship Committee, Technology Committee, 20/20 Strategic Planning Committee, Bell Choir, First Presbyterian Church of Bellevue

February 2015 Science Demo show for Boy Scouts of America Pack 266

March 23, 2015 Led public panel discussion on the Creighton University Energy Technology Program for Nebraskans for Solar

- July - Aug, 2015 LED lighting project for Minden, NE in preparation for Christmas season, they are the “Christmas City” of Nebraska, but suffer from excessive late fees on electricity.
- July 13, 2015 Hosted a Boy Scouts of America merit badge clinic for the Energy and Engineering merit badges. 25 youth attended.
- Nov. 19, 2015 Led a crash course in solar energy to Omaha Central High's Engineering Club. The short course ended with a hands on look at Creighton's 85 kW solar array. Students went on to place in most categories and receiving 5th place overall in an engineering competition based on this and continued interaction.
- Dec. 9, 2015 Finalized feasibility studies for a solar array and presented to the new director and campus coordinator of the MICAH house.
- Dec. 15, 2015 Won the Sarpy County Board’s support for an effort to study the costs and obstacles associated with building a utility scale solar farm on an old Sarpy County Landfill along Cedar Island Road in Bellevue. The project was recently featured in the Bellevue Leader.
- Dec. 18, 2015 First-year students Sierra Brown, Mafer Correa and Teresa Kooima, under the guidance of Dr. Baruth and senior Energy Technology Students, designed a solar powered mobile hospital unit for Afua, Nigeria in consultation with Dr. Ekpenyong.
- Jan. 18, 2016 Meeting with Dean Mueller, OPPD Sustainability Director, and the OPPD “solar feasibility team” to discuss the possibility of a solar farm in Sarpy County.
- Mar. 5, 2016 Assisted with the Nuclear Science Merit Badge Clinic at Creighton University
- May 9, 16, 2016 Scouting for Food – Food Drive
- June 6, 2016 Presents a demo show for the grant "Building Bridges: Health Science Education in Native American Communities." This is part of the Science Education Partnership Award of the NIH.
- 2016-2017 Developing after-school curriculum dealing with energy for the Omaha Henry Doorly Zoo, includes multiple on-site meetings with Education Director and Curriculum Specialists with the zoo.

Professional References

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