

Curriculum Vitae

Surname: Binek
Given name: Christian
Academic degree: Dr. rer. nat. habil.



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Private address:

Marital status: unmarried
Date of birth: 09/04/1965
Place of birth: Duisburg
Nationality: German
Citizenship: Germany/United States of America

Education

1971-1975 Elementary school: Grundschule in Duisburg-Hamborn
1975-1984 Secondary school: Clauberg-Gymnasium in Duisburg-Hamborn earning the matriculation standard

Scientific Education and Appointments

1984-1990 Physics studies at Gerhard-Mercator-Universität Duisburg graduating with the academic degree Diplom-Physiker
Title of the thesis:
„Ramanspektroskopische Untersuchungen der Spin-Phonon-Wechselwirkung in $Fe_{1-x}Zn_xF_2$ “

1990-1995 Ph.D., Physics ([summa cum laude](#))
Title of the thesis (<http://d-nb.info/946948526>):
„Induzierte und inhärente Griffiths-Phasen durch ordnungs-reduzierende Felder in antiferro- und ferromagnetischen Modellsystemen“

1990-1995 Research associate at the Gerhard-Mercator-Universität in the Laboratory of applied physics / experimental physics of Prof. Dr. W. Kleemann

1995-2001	Scientific assistant at the Gerhard-Mercator-Universität
2000-2003	Head of the scientific project A7 “ <i>Spin-structures and exchange bias of magnetic heterosystems</i> ” of the Sonderforschungsbereich 491 “ <i>Magnetic heterolayers: structure and electronic transport</i> ” (http://www.sfb491.de)
2001-2003	Post-doctoral researcher at the Gerhard-Mercator-Universität Duisburg in the Graduiertenkolleg “ <i>Struktur und Dynamik heterogener Systeme</i> ”
Mai 2002	Certificate of habilitation received at the Fakultät für Naturwissenschaften of the Gerhard-Mercator-Universität Duisburg. Title of the thesis: “ <i>Ising-type antiferromagnets: Model systems in statistical physics and the magnetism of exchange bias</i> ”
2003-2009	Assistant Professor of Physics, University of Nebraska
2009-2015	Associate Professor University of Nebraska
2015-present	Professor University of Nebraska
2019-2020	Interim Director of the Nebraska Center for Materials and Nanoscience
2020-present	Director of the Nebraska Center for Materials and Nanoscience
2019-present	Director of the Nebraska Nanoscale Facility
2020-present	Scientific Director EPSCoR Track1 center on Emergent Quantum Materials and Technologies
2021-present	Appointed Charles Bessey University Professor of Physics

Visiting Professor

February – August 2013: Visiting professor at CIC Nanogune Donostia-San Sebastian, Spain

Member of committees at the University of Duisburg

1998-2000 Member of the council of the physics faculty at the Gerhard-Mercator-Universität

Member and chair of department committees at the University of Nebraska

2004-2012	Member of the advanced exam committee in the Department of Physics and Astronomy at UNL
2004-2017	Member of the test grade appeal committee
2005-present	<p>Member and chair of various search committees:</p> <ul style="list-style-type: none"> - Committee member of numerous CMMP faculty searches - Committee member for the search of a faculty in the department of chemistry/ joint position with NCMN - Chair of the search committee for a Materials Research Specialists for the NCMN Materials Preparation - Chair of the search committee for the Facility Coordinator of the Nebraska Nanoscale Facility - Chair of the search committee for the Research Technologists positions at the Nebraska Nanoscale Facility - Chair of the 2022 CMMP faculty search committee for a quantum materials hire
2005-2019	Academic planning committee
2007-2019	Undergraduate advisory committee
2007-present	MRSEC executive committee and leader of the interdisciplinary research group 2 (since 2015 IRG1 leader)
2014-2018	Center for Nanoferroic Devices executive committee and leader of Theme 1
2010-2019	Member of the NCMN advisory committee
2007-2012	Advisor of the Society of Physics Students, chapter UNL
2010-2019	Curriculum and Advising Committee
2011-2015	UNL Marshall
2012-2019	Chair of the Scholarship committee
2012-present	Member of the NCMN Education/Outreach committee
2012-present	Member of the advisory board for a project on “ <i>Improving Teacher Quality: State Grants Program</i> ”
2004-present	Supervisor committee Chemistry Ph.D. candidates: Jun Zhou, Kris Hiebner, Gonghua Wang
2005-present	Supervisor committee Physics Ph.D. candidates: Carolina Ilie, Andrew Baruth, Caroline Ilie, J.D. Burton, Xumin Chen, Simeon Gilbert, James Glasbrenner, Gautam Gurung, Guanhua Hao, Lingmei Kong, Sean Knight, Kristin Kraemer, Hsin-Yu Liu,

Jing Liu, Ning Wu, Rui Zhang, Wang Gonghua, Xiao Jiie, Srinivas Polisetty, Tathagata Mukherjee, Xi He, Xin Zhang, Eric Littaker, Shi Cao, Yi Wang, Junlei Wang, Sai Mu, Shane Sandhofer, Xiaoqin Dang, Xin Zhang, Le Zhang, Uday Singh, Jun Zhou, Kris Hiebner, Peter Beierle (2017), Caleb Fangmeier (2016), Anil Adhikari, Haohan Wang (2022)

2017-present Space committee
2021-present Colloquium committee
2022-present Department Advisory Committee

Committees for Central Facility Users

2013-2019 Faculty Advisor and Chair of the committee for X-Ray Structural Characterization
2013-2019 Member of the committee for Materials Preparation

College Committees at the University of Nebraska

2011-2015 UNL Marshall
2013-2016 College Curriculum and Advising Committee
2020-2021 CAS Inquire Advisory Board

Graduate students supervised to degree completion during the past five years

Former Students

- Dr. Srinivas Polisetty
Graduate student 2004-2009
Thesis: Exchange bias training effect in magnetically coupled bilayers
now Characterization Physicist at Skyworks Solutions, Inc.
- Dr. Tathagata Mukherjee
Graduate student 2005-2011
Thesis: Thermodynamics of Magnetic multilayers
now Principal Engineer at Western Digital - San Jose, California
- Dr. Xi He
Graduate student 2004-2012
Thesis: The Electrically Controlled Exchange Bias
now Research Associate at Brookhaven National Laboratory Oxide Molecular Beam Epitaxy Group of Dr. Ivan Božović
- Yi Wang (Staff Engineer at WD, a Western Digital company)
- Keith Jones
Undergraduate student 2004-2010
now at GlaxoSmithKline Consumer Health, Lincoln NE
- Dr. Mike Street

Graduate student 2013-2018
Thesis: Advancing Magnetoelectric Thin Film Growth for Ultra-Low Power Spintronic Applications
now Preamp Engineer II at Seagate Technology

- Dr. Junlei Wang
Graduate student 2013-2017
Thesis: Voltage-Controllable Magnetoelectrics: New Thin Film Material and Characterization
now Professor in the Center for Optics Research and Engineering (CORE) at Shandong University, China
- Dr, Will Echtenkamp
Graduate student 2012-2021
Thesis: Voltage Controlled Magnetization in Chromia based Magnetic Heterostructures
Now Postdoc at University of Minnesota in the lab of Prof. Jian-Ping Wang

Former post-doc

- Sarbeswar Sahoo Postdoctoral researcher (2006-2008)
now R&D Engineer at Seagate Technology
- Junlei Wang
Postdoc 2017-2020
now Professor in the Center for Optics Research and Engineering (CORE) at Shandong University, China

Synergistic Activities

- 2006-2015: Coordinator of the interdisciplinary research group (IRG) 2 in the framework of UNL's NSF funded materials research science and engineering center (MRSEC)
- 2015-2021: Coordinator of the interdisciplinary research group (IRG) 1 in the framework of UNL's NSF funded materials research science and engineering center (MRSEC)
- 2014-2018: Coordinator of Theme 1 of the Center for Nano Ferroic Devices (CNFD)
- 2018-2020: Theme 1 leader of the Center for Antiferromagnetic Magnetoelectric Memory and Logic (AMML)
- 2023-present Co-director of the UNL grand challenges catalyst award "Quantum Approaches Addressing Global Threats"
<https://research.unl.edu/blog/11-projects-funded-through-grand-challenges-competition/>
- Conference session chair for the American Physical Society and various international meetings

- Conference program committee member of the 11th Int. Conf. on Advanced Materials (ICAM 2009)
- Program committee, 12th Joint MMM/Intermag Conf. Chicago, IL, January 14-18, 2013
- Topic coordinator of the symposium on “ solid state interfaces & grain boundaries”, THERMEC 2013: 8th International Conference on Processing & Manufacturing of Advanced Materials Dec.2-6, 2013 Las Vegas, USA
- Organizer and chair of the Symposium “Electric field control of magnetic properties” at the 58th Annual Magnetism and Magnetic Materials (MMM) Conference Nov. 4-8, 2013 Denver, Colorado.
- Focus Topic organizer of the Magnetic Oxide Thin Films and Heterostructures focus topic area for GMAG at the March meeting of the American Physical Society (APS), March 3 - 7 , 2014 Denver, Colorado
- Chair of the sub-committee on Magnetoelectric Materials and Phenomena at the MMM 2016 in New Orleans, LA,
- 2016-2019 Executive Committee member-at-large of the American Physics Society's Topical Group on Magnetism and its Applications (GMAG)
- Publication Editor for the ICM 2018 conference San Francisco, CA July 2018
http://www.icm2018sf.org/?p=publication_editors
- Chair of the sub-committee for the topical category V. Structured Materials for the 2019 Joint MMM-INTERMAG Conference January 14-18, 2019, Washington D.C., U.S.A.
http://www.magnetism.org/images/docs/2019_Joint_Program_Final_20181217.pdf
- Organizer of the 2022 Nebraska Research & Innovation Conference (NRIC), April 14, 2022 at Embassy Suites, Lincoln
Commercializing Quantum Science in Nebraska
- MMM 2023 Program Committee, member of the subcommittee Magneto-elastic and magneto-caloric materials <https://magnetism.org/program-committee-session-chairs>

Honors

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| 1996 | Annual award of the Duisburger Universitatsgesellschaft for an outstanding Ph.D thesis |
| 2006 | NSF Career award : Education and research on nanoscale spintronic systems and heterostructures |
| 2007 | Sigma Xi Outstanding young scientist award |

- 2009 NCMN Certificate of [appreciation](#) Education & Outreach
- 2013 [IKERBASQUE fellow](#) of the Basque Foundation for Science
- 2014 [NCMN Ambassador Award](#) for exceptional contributions and service to the NCMN education and outreach program

Professional Memberships

- Since 1990 Deutsche Physikalische Gesellschaft e.V.
- Since 2004 Member of Sigma Xi
- Since 2005 Member of the American Physical Society (lifelong)

Research activities outside the University of Nebraska

- 20-28 August 1994 Grenoble, France: neutron scattering at the reactor SILOE
- 12-23 November 1997 Grenoble, France: neutron scattering at the Institute Laue-Langevin (ILL)
- 01-16 March 1998 Tokyo/Wako, Japan: calorimetric measurements at the Institute of Physical and Chemical Research (RIKEN)
- 04-16 October 1998 Grenoble, France: neutron scattering at ILL
- 12-21 September 1999 Grenoble, France: neutron scattering at ILL
- 04-13 December 1999 Tokyo/Wako, Japan: magnetometry at RIKEN
- 13-18 November 2000 Porto, Portugal: investigations of CoFe-multilayers
- 29.4 –5.5. 1999 Berlin, neutron scattering at the Hahn-Meitner-Institute (HMI)
- 19.7-25.7. 1999 Berlin, neutron scattering at HMI
- 23.1-25. 1. 2000 Hamburg, HASYLAB / German Electron-Synchrotron: scattering of high energy synchrotron radiation.
- June 21- July 19, 06 Duisburg Germany, University Duisburg Essen, MBE and magnetometry supported by the German Science Foundation through the Sonderforschungsbereich 491
- July 03-30, 2006 Duisburg Germany, University Duisburg Essen, MBE and magnetometry supported by the German Science Foundation through the Sonderforschungsbereich 491
- 02/01/13 -08/01/13 Visiting professor at the Nanoscience cooperative research center nanoGUNE (<http://www.nanogune.eu/en>), San Sebastian, Spain

Teaching

University of Nebraska Lincoln

<http://www.physics.unl.edu/~cbinek/Teaching.htm>

General Physics 1, Phys 211H, spring 2008, 2009

General Physics 1, Phys 211, fall 2007, spring 2009

General Physics 2, Phys 212H, spring 2011, 2015, 2016, 2017

General Physics 2, Phys 212, fall 2018, spring 2014, 2018, 2019

Physics and Chemistry of Solids, Phys 422: 2003/04, spring 2005, spring
2006, 2010, 2012

Thermal Physics, Phys-431, fall 2004, 2005, 2006, 2008, 2009, 2012, 2019, 2020, 2021, 2023

Statistical Physics, Phys 912, fall 2010, 2011, 2013, 2014, 2015, 2022

Phys 998: spring 2004, 2005 and 2006 and fall 2008, 2009, 2012, 2013, 2014, 2021, 2023

Phys 201H Fall 2006 and 2008, 2009, 2010 (chair), 2011, 2012, 2104, 202, 2023

Phys 899 Fall 2006

Voluntary teaching in the bridging program for incoming graduate students:

Thermal physics (1 week daily) 2011, Thermal physics (2 week daily) 2012, 2023

University of Duisburg

Lectures prior to Habilitation

Experimental Physics III: SS 2000

Laser Physics: WS2000/01

Lectures taught as Privatdozent

Solid State Physics III: WS02/03

Spintronics: SS03

Recitations

Experimental Physics I : WS92/93, WS95/96, SS99, WS99/00

Experimental Physics II : SS93, SS96

Experimental Physics III: WS93/94, WS96/97, WS00/01

Experimental Physics IV: SS91, SS94, SS97

Laser Physics: WS97/98, WS98/99, WS00/01

Solid State Optics and Applied Laser Physics: SS99

Solid State Optics: SS98

Phase Transitions I: WS91/92, WS96/97, WS98/99

Phase Transitions II: WS94/95, SS97

Solid State Physics III: WS02/03

Course for the preparation of the seminar experimental physics/applied physics:

WS91/92, SS92, WS92/93, SS93, WS93/94, SS94, WS94/95, SS95, WS95/96, SS96, WS96/97, SS97, WS97/98, SS98, WS98/99, SS99, WS99/00, WS00/01

WS: winter semester

SS: summer semester

Outreach

<http://physics.unl.edu/~cbinek/Outreach.htm>

- 2009 – present Member of UNL’s Speakers Bureau with numerous requests for Kiwanis Club, Nebraska Citizens for Science, Bethany Lions Club, Sertoma Club, Society of Manufacturing Engineers, Grand Lodge at the Preserve, National Association for Active and Retired Federal Employees, Gretna Optimist Club, and others on topics:
- Physics Between High School and High Tech
 - Magnetic Thin Films: From Basic Research to Spintronics
 - Magnetic Refrigeration
- 2009-present Elementary schools, middle schools and high-schools
- 04/2009 Lincoln North Star High-school
- 06/2010 Science Café at the Red 9
- 12/2010 Bennett elementary school
- 10/2010 Bloomfield elementary school
- 10/2012 Culler middle school after school program
- 10/2013 Culler middle school after school program
- 06/2014 Nebraska College Preparation Academy
- 10/2014 Preparation for Thompson lecture
- 11/2018 Dawes Middle School
- 11/2018 First LEGO
- 06/2019 Rationalists, Empiricists, and Skeptics of Nebraska
- 09/2019 Rationalists, Empiricists, and Skeptics of Nebraska
- 01/2020 CAS Inquire lecture <https://mediahub.unl.edu/media/12170>
- 01/2022 Sigma Xi Science Café, University of Nebraska-Kearney,
Emergent Quantum Materials and Technologies: What are they and why should I care ?
<https://unknews.unk.edu/2022/01/24/science-cafe-presenter-christian-binek-discussing-future-of-quantum-materials/>
- 06/2022 Middle school E/O presentation “*Illustrating the Physics of Waves by the Dance of Fire*”, UNL June 09, 2022
- 2009-present Outreach activities for the NCMN:
- Bright Lights
 - Interactive Science Experience
 - Big Red Stars
 - Nebraska College Preparatory Academy
 - High-school Interns

Talks and contributions to conferences

Congressional hearing

- Testimony before the Subcommittee on Commerce, Manufacturing, and Trade of the one hundred thirteenth Congress of the United States, 2322 Rayburn House Office Building, Washington, DC July 29th, 2014
Nanotechnology: Understanding how small solutions drive big innovation

<http://energycommerce.house.gov/hearing/nanotechnology-understanding-how-small-solutions-drive-big-innovation>

University of Nebraska Board of Regents Meeting

- Strategic Framework Report on Research, June 12, 2015, Lincoln, NE
Polarization and Spin Phenomena in Nanoferroic Structures, [Christian Binek](#)
<http://nebraska.edu/media-resource-center/news-releases/1624-nu-board-of-regents-to-meet-june-12.html>

Invited talks (national and international)

- TMS 2024 Annual Meeting in the Advanced Soft Magnets and Magnetocaloric Materials Symposium honoring Victorino Franco, Orlando, FL March 3-7, 2024
Christian Binek, Syed Qamar Abbas Shah, Balamurugan Balasubramanian
Entropy change at a demagnetization broadened first order transition
<https://www.programmaster.org/PM/PM.nsf/ApprovedAbstracts/B69DA394C6F724FC852589EA005D891D?OpenDocument>
- MRS Fall Meeting Boston, MA, November 26 – December 1, 2023,
Christian Binek, Ather Mahmood, Jamie Weaver, Will Echtenkamp, Syed Qamar Abbas Shah, Jeffrey Lynn
Post deposition interfacial Néel temperature tuning in magnetoelectric B:Cr₂O₃
<https://www.mrs.org/meetings-events/presenter/Christian-Binek->
- AVS 68th International Symposium & Exhibition, Pittsburgh, PA, USA, November 6 - 11, 2022, Christian Binek, Ather Mahmood, Will Echtenkamp, Mike Street, Jun-Lei Wang, Shi Cao, Takashi Komesu, Peter Dowben, Pratyush Buragohain, Haidong Lu, Alexei Gruverman, Arun Parthasarathy, Shaloo Rakheja, *Voltage Controlled Néel Vector Rotation in Zero Magnetic Field*
<https://avs68.avs.org/wp-content/uploads/2022/02/Technical-Program.pdf>
- Quantum Nanofabrication Workshop, Boulder Co, November 3-4, 2022
Christian Binek, *New and Traditional Tools for Quantum Materials and Technologies*
<https://www.colorado.edu/ecee/quantum-nanofabrication-workshop#schedule-873>
- MRS Fall Meeting (Virtual), Christian Binek, Ather Mahmood, Will Echtenkamp, Mike Street, Jun-Lei Wang, Shi Cao, Takashi Komesu, Peter Dowben, Pratyush Buragohain, Haidong Lu, Alexei Gruverman, Arun Parthasarathy, Shaloo Rakheja, *Voltage Controlled Néel Vector Rotation in Zero Magnetic Field*, Dec. 8, 2021 (via Zoom).
- Congressional staff campus visit University of Nebraska at Omaha, Omaha, NE, Preparing and Protecting Our Nation Congressional Staff Presentation, *Emergent Quantum Materials and Technologies*, Nov. 9, 2021.
- University of Nebraska Department of Physics and Astronomy Colloquium, *Voltage Controlled Néel Vector Rotation in Zero Magnetic Field*, Sept. 2, 2021

- National Nanotechnology Coordinated Infrastructure Quantum Engineering Infrastructure Workshop, April 15, 2021 (via Zoom).
- International Webinar on Physics, Pabna University of Science & Technology (Bangladesh), *Voltage Controlled Néel Vector Rotation in Zero Magnetic Field*, May 26, 2021 (via Zoom).
- Online Spintronics Seminar, *Voltage Controlled Néel Vector Rotation in Zero Magnetic Field*, July 23, 2021 (via Zoom).
- LNMM NISER (India), *Voltage Controlled Néel Vector Rotation in Zero Magnetic Field*, April 28, 2021 (via Zoom).
- TANMS Advanced Research Strategy Meeting, Magnetolectric Driven Spintronics Virtual Symposium, *Voltage Controlled Néel Vector Rotation in Zero Magnetic Field*, February 11, 2021 (via Zoom).
- Nebraska EPSCoR committee, *Emergent Quantum Materials and Technologies*, September, 23, 2020
- Symposium EL-03 Multiferroics and Magnetolectrics in the Fall 2019 MRS Meeting at Boston , December 1-6, 2019), *Voltage Controlled Néel Vector Switching in High- T_N Magnetolectric Thin Films*, Ch. Binek, <https://www.mrs.org/fall2019>
- Gordon Research Conference, Multiferroic and Magnetolectric Materials, Lewiston, ME, August 5-10, 2018, *Voltage-Controlled Switching of Boundary Magnetization: Phenomena Beyond Linear Magnetolectricity with Spintronic Applications*, Ch. Binek <https://www.grc.org/multiferroic-and-magnetolectric-materials-conference/2018/>
- International Conference on Magnetic Materials and Applications (ICMAGMA-2018), Bhubaneswar, India, December 9-13, 2018, *Dynamic Axion Field in the Magnetolectric Antiferromagnet Chromia*, Ch. Binek <http://www.niser.ac.in/icmagma2018/speakers.php>
- Seminar at The LNM Institute of Information Technology, Jaipur, India, December 17, 2018, *Voltage-controlled switching of boundary magnetization: A fundamental interface phenomenon with application in ultra-low power spintronics*, Ch. Binek, W. Echtenkamp, A. Mahmood, P. Dowben, J. Wang
- IW-MAG' 18 International Workshop on Magneto-Electric Actuation, Magneto-Induced and related Phenomena in High-Surface Area Materials, Barcelona, Spain May 28-30, 2018, *Voltage-controlled switching of boundary magnetization: A fundamental interface phenomenon with application in ultra-low power spintronics*, Ch. Binek, W. Echtenkamp, A. Mahmood, P. Dowben, J. Wang <http://pagines.uab.cat/spinporics/ca/content/invited-speakers-confirmed>
- Colloquium University of Nebraska, Lincoln, September 14, 2017, Christian Binek, *It's not much of a stretch to tune elastic properties by means of magnetism* <https://www.unl.edu/physics/2017-2018-colloquia-abstracts#2017Binek>

- 2017 MRS Fall Meeting, Boston, MA, November 26-December 1, 2017, *Voltage-controlled switching of boundary magnetization: A fundamental phenomenon with potential application in ultra-low power spintronics*, Christian Binek, W. Echtenkamp, M. Street, A. Mahmood, P.A. Dowben, J. Wang, <https://mrsfall.zerista.com/profile/member/1721196>
- 17th IEEE International Conference on Nanotechnology, Pittsburgh, PA, July 25-28, 2017, USA, *Voltage-controlled exchange bias: A building block for ultra-low power memory and logic device applications*, Christian Binek, W. Echtenkamp, M. Street, A. Mahmood, J. Wang https://nano.papercept.net/conferences/conferences/NANO17/program/NANO17_ContentListWeb_1.html
- Colloquium University of Northern Iowa, Cedar Fall, Iowa, April 12, 2017, Christian Binek, *Voltage-controlled exchange bias: A building block for ultra-low power memory and logic device applications*, <https://www.physics.uni.edu/physics-colloquium-voltage-controlled-exchange-bias-building-block-ultra-low-power-memory-and-logic>
- Electrical Engineering Seminar, University at Buffalo, November 18, 2016, Buffalo, NY, *Voltage-controlled exchange bias: A building block for ultra-low power memory and logic device applications*, Christian Binek, W. Echtenkamp, M. Street, A. Mahmood, J. Wang, <http://www.buffalo.edu/calendar/calendar?action=describe&which=699229C8-AB51-11E6-85FE-9C1A6990BC6E>
- Keynote Speaker at the EMN 2016, October 10-12,2016, Las Vegas, NV, *Voltage-controlled exchange bias: A building block for ultra-low power memory and logic device applications*, <http://emnmeeting.org/Vegas/spintronics/keynote/>
- 4th US Government working group on magnetic tunnel junctions (Security Level: UNCLASSIFIED), October 6-7, 2016, University of Maryland in College Park, MD, *Voltage-controlled magnetism: a route to ultra-low power memory and logic devices*, Christian Binek, W. Echtenkamp, X. He, M. Street, A. Mahmood, J. Wang, K. Belashchenko, P. Dowben
- International Conference on Electronic Materials ICEM2016, 4-8 July 2016, Singapore, *Voltage-controlled exchange bias in lithographically patterned heterostructures*, Christian Binek, W. Echtenkamp, X. He, M. Street, A. Mahmood, J. Wang, K. Belashchenko, P. Dowben <http://www.mrs.org.sg/icem2016/public.asp?page=session.asp&slId=4>
- 5th International Conference Smart and Multifunctional Materials Structures and Systems CIMTEC 2016, June 5-9, 2016, Perugia, Italy, *Voltage-controlled Exchange Bias in Lithographically Patterned Heterostructures*, C. Binek, W. Echtenkamp, X. He, M. Street, A. Mahmood, J. Wang, K. Belashchenko, P. Dowben, http://2016.cimtecongress.org/data/image/pdf/final_programme_cimtecon2016.pdf
- Magnetic North V, June 26-30, 2016, Colorado Springs, Denver,

Voltage-controlled exchange bias: A building block for ultra-low power memory and logic device applications, Christian Binek, W. Echtenkamp, X. He, M. Street, A. Mahmood, J. Wang, K. Belashchenko and P. Dowben
<http://www.magneticnorth.mun.ca/MagNorthV/>

- 13th Joint MMM-Intermag Conference, January 11-15, 2016, San Diego, California, *Magnetolectric antiferromagnets for ultra-low power memory and logic device applications*, Christian Binek, W. Echtenkamp, X. He, M. Street, A. Mahmood, J. Wang, K. Belashchenko and P. Dowben
http://www.magnetism.org/data_files/13th_joint_2016.pdf
- Workshop on Multifunctional Nanomaterials, December 15-18, 2015, San Juan, Puerto Rico, USA, *Voltage-controlled exchange bias in lithographically patterned heterostructures*, Christian Binek, W. Echtenkamp, M. Street, A. Mahmood, J. Wang, K. Belashchenko, P. Dowben
<http://www.multifunctionalnanomaterials.org/keynote-speakers.html>
- EMN (Energy Materials Nanotechnology) Fall Meeting 2015, November 16-19, 2015 Las Vegas, NV
Voltage-controlled exchange bias in lithographically patterned heterostructures, Christian Binek, W. Echtenkamp, X. He, M. Street, A. Mahmood, J. Wang, K. Belashchenko, P. Dowben
<http://www.emnfall.org/2015/invited-speakers/>
- 1st ImPACT (International Symposium on Spintronic Memory, Circuit and Storage), June 21-22, 2015, Tokyo, Japan
Voltage-Controlled Exchange Bias through Switchable Boundary Magnetization in Magnetolectric Antiferromagnets, Christian Binek, W. Echtenkamp, X. He, M. Street, A. Mahmood, J. Wang, K. Belashchenko, P. Dowben
<https://impact.jst.go.jp/sympo/sahashi/program.pdf>
- 59th Annual Magnetism & Magnetic Materials Conference, Honolulu, Hawaii, November 3-7, 2014
Voltage-controlled Exchange Bias: Advances towards Magnetolectric Device Applications, Christian Binek, Will Echtenkamp; Mike Street; Junlei Wang
http://www.magnetism.org/docs/programs/2014_Program_Book_And_Cover.pdf
- American Vacuum Society AVS 61 meeting, Baltimore Nov 9-14, 2014
Voltage-controlled Exchange Bias and Exchange Bias Training, Christian Binek
<https://www.avs.org/AVS/files/76/7613ce82-af62-4138-9b44-a4eb956ecd9c.pdf>
- Energy Materials Nanotechnology 2014 Fall meeting, University of South Florida, Nov. 22-25, 2014
Voltage-controlled Exchange Bias and Exchange Bias Training, Christian Binek
<http://www.emnfall.org/2014/functional-materials/>
- Fifth Seeheim Conference on Magnetism, Frankfurt / Germany, September 29 – October 3, 2013 “*Electric Control of Exchange Bias Training*”, Christian Binek
http://www.mawi.tu-darmstadt.de/media/nano_workshop_moessbauer/Program_SCM2013-3.pdf

- Colloquium University of South Florida, “*Isothermal electric switching of interface magnetization: A route to voltage-controlled spintronics*”, October 4, 2013
<http://physics.usf.edu/news/colloquium.aspx>
- 13th Non-Volatile Memory Technology Symposium, Univ. Of Minnesota, Minneapolis, August 12-14, 2013 „*Voltage-controlled Exchange Bias for ultra-low power MRAM Applications*“, Christian Binek
http://www.ece.umn.edu/nvmts2013/conference_program_update.html
- APS March Meeting in Baltimore, Maryland, March 18-22, 2013, “*Probing equilibrium by nonequilibrium dynamics: Aging in Co/Cr superlattices*”, Christian Binek
<http://absuploads.aps.org/presentation.cfm?pid=10486>
- IMAGINENANO 2013, Section Nanospain 2013, Bilbao, Spain, April 23-26, 2013 “*Isothermal electric control of exchange bias near room temperature*”, Christian Binek, Xi He, Yi Wang, N. Wu, A. Wysocki, T. Komesu, U. Lanke, A. N. Caruso, E. Vescovo, K. D. Belashchenko¹, P. A. Dowben
http://www.imagenenano.com/SCIENCE/Scienceconferences_NanoSpain2013.php
- nanoGUNE seminar, Donostia - San Sebastian, Date: March 11, 2013, “*Isothermal electric control of exchange bias near room temperature*”, Christian Binek, Xi He, Yi Wang, N. Wu, A. Wysocki, T. Komesu, U. Lanke, A. N. Caruso, E. Vescovo, K. D. Belashchenko¹, P. A. Dowben
<http://www.nanogune.eu/en/seminars/>
- nanoGUNE group seminar, Donostia - San Sebastian, Date: March 08, 2013, “*Probing equilibrium by nonequilibrium dynamics: Aging in Co/Cr superlattices*”, Ch. Binek
- Nanoelectronics Research Initiative e-Workshop series, September 18, 2012 “*Electrically Switchable Boundary Magnetization for Voltage-controlled Functionality in Magnetic Nanostructures*”, Christian Binek, K. D. Belashchenko, P. A. Dowben
- Spintronics V Symposium of the SPIE Optics & Photonics Conference in San Diego, CA, 12 - 16 August 2012, “*Isothermal electric control of exchange bias near room temperature*”
Christian Binek, Xi He, Yi Wang, N. Wu, A. Wysocki, T. Komesu, U. Lanke, A. N. Caruso, E. Vescovo, K. D. Belashchenko¹, P. A. Dowben
- CIMTEC 2012 – 4th International Conference on Smart Materials, Structures and Systems, Montecatini Terme, Italy June 10 to 14, 2012 Focus Session Multiferroics “*Isothermal electric control of exchange bias near room temperature*”
Christian Binek, Xi He, Yi Wang, N. Wu, A. Wysocki, T. Komesu, U. Lanke, A. N. Caruso, E. Vescovo, K. D. Belashchenko¹, P. A. Dowben
<http://www.cimtecongress.org/2012/invited.asp>
- Oxide Spintronics Seminar, Tohoku University, Japan March 7, 2012 “*Isothermal electric control of exchange bias near room temperature*”

Christian Binek, Xi He, Yi Wang, N. Wu, A. Wysocki, T. Komesu, U. Lanke, A. N. Caruso, E. Vescovo, K. D. Belashchenko¹, P. A. Dowben



- ESRF users' meeting 2012, Magnetic Materials Workshop: Magnetic Materials under Extreme Conditions, Grenoble France, February 6-9, 2012, "*Isothermal electric control of exchange bias near room temperature*", Binek Ch. He Xi, Wang Yi, Wu N., Wysocki A., Komesu T., Lanke U., Caruso A.N., Vescovo E., Belashchenko K.D., Dowben P.A.
<http://www.esrf.eu/events/conferences/users-meeting-2012-workshops/workshop-magnetic-materials/Programme.pdf>
- Materials Research Society Spring 2011 Meeting, San Francisco, CA, 25–29 April, 2011 Symposium "Multiferroic, ferroelectric, and functional materials, interfaces, and heterostructures", "*Control and imaging of boundary magnetization in chromia: from room temperature electric switching of exchange bias to photoemission electron microscopy*", Christian Binek, Xi He¹, Yi Wang, N. Wu, A. Wysocki, T. Komesu, U. Lanke, A. N. Caruso, E. Vescovo, K. D. Belashchenko, P. A. Dowben
- Materials Science and Technology, October 16-20, 2011 Columbus Ohio, "*Robust isothermal electric control of exchange bias*"
- Argonne Nat. Lab. User meeting Emergent Interfacial Phenomena, May 03, 2011, "*Robust isothermal electric control of exchange bias*"
<http://www.2011usersmeeting.conference.anl.gov/WKBEmergIntAgenda.htm>
- March Meeting of the American Physical Society, Dallas Texas March 21-24, 2011, "*Robust isothermal electric control of exchange bias*"
<http://meetings.aps.org/Meeting/MAR11/Event/143565>
- Annual Meeting of the Minerals Metals and Materials Society, San Diego, February 27-March 3, 2011, "*Nanostructured Materials for Magnetic Refrigeration*",

Christian Binek, Tathagata Mukherjee, Ralph Skomski, Dave Sellmyer, Steve Michalski, R.F. Sabirianov

- 55th Conference on Magnetism and Magnetic Materials (MMM2010), November 14 - 18, 2010 Atlanta, Georgia
“Robust isothermal electric switching of interface magnetization: A route to voltage-controlled spintronics”,
Christian Binek, Xi He, Yi Wang, N. Wu, A. Caruso, E. Vescovo, K. D. Belashchenko, P. A. Dowben
- Colloquium University of Nebraska, Lincoln November 04, 2010
“Isothermal electric switching of interface magnetization: A route to voltage-controlled spintronics”
- Colloquium Florida Atlantic University, October 08, 2010
“Isothermal electric switching of interface magnetization: A route to voltage-controlled spintronics”
http://www.physics.fau.edu/events_news/past_events_news/colloquia2010Fall.php
- International Symposium on Integrated Functionalities ISIF 2010, June 13-16, 2010 San Juan, Puerto Rico
“Robust isothermal electric switching of interface magnetization: A route to voltage-controlled spintronics”,
Christian Binek, Xi He, Yi Wang, N. Wu, A. Caruso, E. Vescovo, K. D. Belashchenko, P. A. Dowben (<http://www.isif.net/>)
- Fourth Seeheim Conference on magnetism (SCM2010) March 28 to April 1, 2010 Frankfurt, Germany
“Robust isothermal electric switching of interface magnetization: A route to voltage-controlled spintronics”,
Christian Binek, Xi He, Yi Wang, N. Wu, A. Caruso, E. Vescovo, K. D. Belashchenko, P. A. Dowben <http://www1.tu-darmstadt.de/magnetism/speaker.htm>
- Spintronic Symposium of the SPIE conference, San Diego California, August 2008,
“Electrically controlled Magnetism”
<http://spie.org/app/program/index.cfm?fuseaction=conferencedetail&conference=7036>
- Colloquium University of Nebraska, Lincoln September 13, 2007 “Electric and Magnetic Field Control of Exchange Bias”
- March Meeting of the American Physical Society, Denver Colorado March 8, 2007, “Electric and magnetic field control of exchange bias”
(<http://meetings.aps.org/Meeting/MAR07/Event/61139>)
- Colloquium Virginia Tech, February 09, 2007, “Electric and Magnetic field control of Exchange Bias” (<http://www.phys.vt.edu/~talks/colloquia/colloquia0607.html>)
- 10th Joint MMM/Intermag, January 07 - 11, 2007, Symposium Probing the magnetic structure of nanostructured exchange: “Electric and Magnetic field control of Exchange Bias”
(<http://www.aip.org/mmm/symposia.pdf>)

- Trends on Novel Materials, Cartagena Santa Marta Colombia October 16-20, 2006, “*Electric and Magnetic field control of Exchange Bias*” (http://calima.univalle.edu.co/tnm/guest_speakers.htm)
- Seminar of the SFB 491 Duisburg-Bochum, and the GRK 277, Germany July 11, 2006, “*Dynamic enhancement of the exchange bias training effect*” (<http://www.physik.ruhr-uni-bochum.de/imperia/md/content/physik/dokumente/aktuell/wplan06.pdf>)
- European-MRS 2005 spring meeting May 31 - June 3, 2005, Symposium B: Spintronics, “*Electrically controlled Exchange Bias for Spintronic Applications*”
- Seminar of the SFB 491 Duisburg-Bochum, Germany July 27, 2004, “*Training of the Exchange Bias: A simple analytic Approach*” (<http://www.ep4.ruhr-uni-bochum.de/sfb/seminare/2004/index.html>)
- Arizona State University, Department of Physics and Astronomy, Soft matter series, February 4, 2004 “*New Aspects of Exchange Bias: Electric Control and Training*”
- Seeheim Conference on Magnetism, Seeheim September 2001
Exchange bias of FeF₂/CoPt and Fe_{0.6}Zn_{0.4}F₂/Fe heterostructures
- Spring meeting of the Deutsche Physikalische Gesellschaft (Hauptvortrag), Münster 1999
Bestimmung der Lee-Yang Nullstellendichte mit Hilfe isothermer Magnetisierungsdaten
- International Workshop on Magnetism in Lower Dimensions, Tokyo (Japan) 1999
Density of Zeros on the Lee-Yang circle obtained from magnetization data of a two-dimensional Ising ferromagnet
- 24th International Meeting on Statistical Physics, Lutherstadt Wittenberg März 1999
Density of Zeros on the Lee-Yang circle obtained from magnetization data of a two-dimensional Ising ferromagnet
- 5th Mini-Workshop SFB 491: Exchange Bias in Heterolayer Systems, Duisburg 2000
Influence of the pinning layer susceptibility on the exchange bias effect
- Physikalisches Kolloquium Gerhard-Mercator-Universität Duisburg, Duisburg 2000
Lee-Yang-Nullstellendichten: Theorie und experimentelle Bestimmung
- Seminar des 3. Physikalischen Instituts der Universität Erlangen-Nürnberg, Mai 1999
Bestimmung der Lee-Yang Nullstellendichte mit Hilfe isothermer Magnetisierungsdaten
- Graduiertenkolleg: Transportphänomene und Phasenübergänge, Walberg/Köln Mai 1999
Domänenzustände in magnetischen Modellsystemen
- The Institute of Physical and Chemical Research (RIKEN), Wako Saitama (Japan) 1998
Fluctuation induced phenomena in layered antiferromagnetic compounds
- Condensed Matter Seminar University of California, Santa Cruz (USA) 1996

Fluctuation induced phenomena in layered antiferromagnetic compounds

- Workshop: Phase Transition in Dilute systems, Physikzentrum Bad Honnef 1995
Dilution and field induced Griffiths phases in ferro- and antiferromagnetic model systems

Contributed Talks and Posters

- Spin Caloritronics, May 23-27, 2022 University of Illinois at Urbana-Champaign
S. Rakheja, A. Parthasarathy, and C. Binek
Physics and modeling of antiferromagnetic memory and oscillator devices based on Cr₂O₃
<http://publish.illinois.edu/spin-cal-xi/files/2022/05/FINAL-Spin-Caloritronics-2022-Program.-v05.10.2022.pdf>
- APS March Meeting 2022, Chicago March 14-18, 2022
 - *Nanoscale imaging of antiferromagnetic domains in epitaxial Cr₂O₃ films using diamond quantum sensing microscopy*
Adam Erickson, Ather Mahmood, Syed Qamar Abbas Shah, Rupak Timalisina, Christian Binek, Abdelghani Laraoui,
<https://meetings.aps.org/Meeting/MAR22/Session/B53.12>
 - *Effects of Boron diffusion on the surface Néel temperature revealed by magnetotransport and cold neutron depth profiling in B-doped Cr₂O₃ films*
Syed Qamar Abbas Shah, Ather Mahmood, Will Echtenkamp, Jamie L Weaver, Jeffrey W Lynn, Christian Binek
<https://meetings.aps.org/Meeting/MAR22/Session/G53.8>
 - *Large refrigerant capacity in rare earth free nanostructures of matrix embedded Fe nanoparticles*
Kaushik Sarkar, Surabhi m Shaji, Suchit Sarin, Jeffrey Shield, Christian Binek, Dhananjay Kumar
<https://meetings.aps.org/Meeting/MAR22/Session/S54.2>
 - *Axion electrodynamics with magnetoelectric Chromia*
Syed Qamar Abbas Shah, Ather Mahmood, Allan H MacDonald, Christian Binek
<https://meetings.aps.org/Meeting/MAR22/Session/S68.10>
 - *Voltage-controlled Néel vector rotation in zero magnetic field in high-T_N magnetoelectric thin films*
Syed Qamar Abbas Shah, Ather Mahmood, Will Echtenkamp, Junlei Wang, Mike Street, Takashi Komesu, Peter A Dowben, Pratyush P Buragohain, Haidong Lu, Alexei Gruverman, Arun Parthasarathy, Shaloo Rakheja, Christian Binek
<https://meetings.aps.org/Meeting/MAR22/Session/T00.212>
 - *On the Clock Frequency of the Néel-Vector Mode in Antiferromagnets*
Ralph Skomski, Ahsan Ullah, Balamurugan Balasubramanian, Christian Binek
<https://meetings.aps.org/Meeting/MAR22/Session/T54.5>
 - *Proximity effects in graphene/chromia heterostructures*
Keke He, Ather Mahmood, Will Echtenkamp, Peter A Dowben, Christian Binek, Jonathan P Bird
<https://meetings.aps.org/Meeting/MAR22/Session/Y52.3>

- March Meeting of the American Physical Society, Boston, MA, March 4–8, 2019
 - *Magnetoelectric device read-out schemes based on electric resistivity measurements in heavy metal Hall bar structures*
A. Mahmood, W. Echtenkamp, J. Wang, Ch. Binek
<http://meetings.aps.org/Meeting/MAR19/Session/S39.14>
 - *Probing boundary magnetization with spin Hall magnetoresistance in high T_N boron-doped magnetoelectric Cr_2O_3*
W. Echtenkamp, A. Mahmood, Ch. Binek
<http://meetings.aps.org/Meeting/MAR19/Session/X40.8>
- MRS meeting November 25-30, 2018, Boston, MA,
 - *Magnetic and Magnetocaloric Properties of Fe-(W)Ta Thin Films*, Surabhi Shaji, Nikhil Mucha, Prakash Giri, Christian Binek, Dhananjay Kumar
<https://mrsfall2018.zerista.com/event/member/528441>
 - *Titanium Oxynitride Thin-Films with Large Power Conversion Efficiency in Photovoltaic Solar Cells*,
Nikhil Mucha, Michael Froeschle, Mark Anderson, Panupong Jaipan, Hemali Rathnayake, Christian Binek, Jeffrey Shield, Dhananjay Kumar
<https://mrsfall2018.zerista.com/event/member/531605>
- March Meeting of the American Physical Society, Los Angeles, CA, March 5–9, 2018
 - *An AC technique to directly measure magnetic field induced adiabatic temperature change*,
P. Giri, W. Echtenkamp, Ch. Binek,
<http://meetings.aps.org/Meeting/MAR18/Session/K19.9>
 - *Dynamic axion field in a trivial magnetoelectric insulator*,
J. Wang, Ch. Binek,
<http://meetings.aps.org/Meeting/MAR18/Session/V14.5>
 - *Voltage Control of Magnetization in a Chromia Based Thin Film Heterostructure*,
W. Echtenkamp, M. Street, A. Mahmood, Ch. Binek,
<http://meetings.aps.org/Meeting/MAR18/Session/V23.5>
 - *Electrode optimization for improved magnetoelectric switching behavior in ultra-thin Cr_2O_3 films*,
A. Mahmood, M. Street, W. Echtenkamp, Ch. Binek,
<http://meetings.aps.org/Meeting/MAR18/Session/V23.6>
 - *Tuning Néel temperature and anisotropy of magnetoelectric Cr_2O_3 for enhanced performance in voltage-controlled spintronic devices*,
M. Street, W. Echtenkamp, T. Komesu, S. Ciao, P. Dowben, Ch. Binek,
<http://meetings.aps.org/Meeting/MAR18/Session/V23.7>
- 62nd Annual Conference on Magnetism and Magnetic Materials (MMM 2017), Pittsburgh, PA, November 6-10, 2017,
R. Skomski, A. Kashyap, P.A. Dowben, and Ch. Binek, *Magnetoelectric Figures of Merit*, http://magnetism.org/doc/mmm17_Program_WEB_FINAL.pdf
- March Meeting of the American Physical Society, New Orleans, LA, March 13–17, 2017
 - *Voltage-induced entropy change in complex oxide thin films via electrostatic doping*,
P. Giri, D. Kumar, Ch. Binek
<https://meetings.aps.org/Meeting/MAR17/Session/S43.7>

- *Tuning the effective anisotropy in a voltage-susceptible exchange bias heterosystem,*
W. Echtenkamp, M. Street, A. Mahmood, Ch. Binek
<https://meetings.aps.org/Meeting/MAR17/Session/S43.10>
 - *Enhanced resistivity in voltage-controlled exchange-bias devices,*
A Mahmood, W. Echtenkamp, M. Street, Ch. Binek, C. Kwan, J. Bird
<https://meetings.aps.org/Meeting/MAR17/Session/S43.12>
 - *Tuning Néel temperature and anisotropy of magnetoelectric Cr₂O₃ via doping for enhanced performance in voltage-controlled spintronic device,*
M. Street, W. Echtenkamp, T. Komesu, S. Cao, J. Wang, P. Dowben, Ch. Binek,
<https://meetings.aps.org/Meeting/MAR17/Session/S43.13>
 - *Correlated electric-field induced reversal of antiferromagnetic order and surface magnetization in magnetoelectric Cr₂O₃,*
J. Wang, U. Singh, Ch. Binek,
<https://meetings.aps.org/Meeting/MAR17/Session/S43.14>
 - *Determining the sign of exchange coupling in a chromia based perpendicular exchange bias heterostructure,*
U. Singh, M. Street, W. Echtenkamp, Ch. Binek, S. Adenwalla
<https://meetings.aps.org/Meeting/MAR17/Session/S43.15>
- March Meeting of the American Physical Society, Baltimore, MD, March 14-18, 2016
 - *Eliminating leakage current in voltage-controlled exchange-bias devices,*
A Mahmood, W. Echtenkamp, M. Street, Ch. Binek
<https://meetings.aps.org/Meeting/MAR16/Session/X19.12>
 - *Voltage Control of Exchange Bias in a Chromium Oxide Based Thin Film,*
W. Echtenkamp, M. Street, A. Mahmood, Ch. Binek
<https://meetings.aps.org/Meeting/MAR16/Session/X19.11>
 - *Direct measurement of voltage-controlled reversal of the antiferromagnetic spin structure in magnetoelectric Cr₂O₃,* J. Wang, Ch. Binek
<https://meetings.aps.org/Meeting/MAR16/Session/X19.10>
 - *Two phase multiferroics for voltage-induced entropy change with application in near-room-temperature refrigeration,* P. Giri, D. Kumar, Ch. Binek,
<https://meetings.aps.org/Meeting/MAR16/Session/T1.235>
 - *Increased operational temperature of Cr₂O₃-based spintronic devices,*
M. Street, W. Echtenkamp, T. Komesu, S. Cao, J. Wang, P. Dowben, Ch. Binek,
<https://meetings.aps.org/Meeting/MAR16/Session/R19.3>
- March Meeting of the American Physical Society, San Antonio, Texas, March 2-6, 2015
 - *The effects of shape anisotropy and exchange coupling on spin precession frequencies in exchange coupled Co/Cu/Py trilayers*
Sam Keramati, Uday Singh, Seth Kurfman, Ch. Binek, S. Adenwalla
<http://meetings.aps.org/Meeting/MAR15/Session/H1.145>
 - *Simultaneous Kerr and Faraday investigations of boundary magnetization and order parameter switching in voltage-controllable exchange bias films,* J. Wang, W. Echtenkamp, M. Street, Ch. Binek
<http://meetings.aps.org/Meeting/MAR15/Session/Q32.10>
 - *Voltage Controlled Exchange Bias in Cr₂O₃ based heterostructures,*
W. Echtenkamp, M. Street, Ch. Binek
<http://meetings.aps.org/Meeting/MAR15/Session/Q32.11>
 - *Spin relaxation time dependence on optical pumping in GaAs:Mn,* V. Burobina,

- Ch. Binek
<http://meetings.aps.org/Meeting/MAR15/Session/S31.6>
- *Investigation of Boundary Magnetization and Exchange Bias of B-doped Chromia*, M. Street, W. Echtenkamp, Ch. Binek
<http://meetings.aps.org/Meeting/MAR15/Session/T30.14>
 - *Local control of antiferromagnetic domains in Cr₂O₃*, S. Adenwalla, U. Singh, W. Echtenkamp, Ch. Binek
<http://meetings.aps.org/Meeting/MAR15/Session/Y32.6>
 - *Ferromagnetic boundary magnetization properties of epitaxial Cr_{(2-x)Al_xO₃}*, L. Fallarino, Ch. Binek, A. Berger,
<http://meetings.aps.org/Meeting/MAR15/Session/Y32.8>
- IEEE International Magnetism Conference, Dresden, Germany May 4-8, 2014
Voltage-controlled Exchange Bias and Exchange Bias Training “,Christian Binek
http://intermag2014.ifw-dresden.de/index.php?id=33&no_cache=1&pd=484
- March Meeting of the American Physical Society, Denver, Colorado, March 3-7, 2014
 - *The surface magnetization study of Cr₂O₃ by spin polarized low energy electron microscopy*
 Shi Cao, Ning Wu, Xin Zhang, Alpha N'Diaye, Gong Chen, Andreas Schmid, Will Echtenkamp, Valeria Lauter, Christian Binek, Peter Dowben
<http://meetings.aps.org/Meeting/MAR14/Session/Q7.3>
 - *Correlation between bulk magnetoelectricity and boundary magnetization in Cr₂O₃*
 Junlei Wang, Christian Binek
<http://meetings.aps.org/Meeting/MAR14/Session/A41.9>
 - *Graphene mediated magnetic domain formation*
 Iori Tanabe, Yi Wang, Lingmei Kong, Christian Binek, Frank Pasquale, Yuan Cao, Bin Dong, Jeffrey Kelber, Peter Dowben
<http://meetings.aps.org/Meeting/MAR14/Session/Q7.8>
 - *Voltage controlled exchange bias in an all-thin-film Cr₂O₃ based heterostructure*
 Will Echtenkamp, Christian Binek
<http://meetings.aps.org/Meeting/MAR14/Session/B6.2>
 - *Boundary Magnetization and Exchange Bias of Boron Doped Cr₂O₃ Pinning Layers*
 Michael Street, Will Echtenkamp, Peter Dowben, Christian Binek
<http://meetings.aps.org/Meeting/MAR14/Session/H1.251>
 - 58th Annual Conference on MMM, November 4-8, 2013, Denver, Colorado, *Electric Control of Exchange Bias Training*, W. Echtenkamp, Ch. Binek
http://www.magnetism.org/MMM_58th_Program_Web.pdf
 - 12th joint MMM/Intermag conference, Chicago, IL, January 14-18, 2013,
 - *Fast strain driven ordering of magnetoelectric Cr₂O₃ thin films for straintronic applications*,
 U. Singh, W. Echtenkamp, Ch. Binek, and S. Adenwalla
 - *Isothermal Electric Field-Tuning of Exchange Bias, Training in Cr₂O₃/PdCo*,
 W. Echtenkamp and Ch. Binek
http://www.magnetism.org/12th_program.pdf
 - March Meeting of the American Physical Society, Baltimore, MD, March 18-22, 2013,
 - *Isothermal electric field-tuning of Exchange bias training in Cr₂O₃/PdCo*, W. Echtenkamp, Ch. Binek
<http://meeting.aps.org/Meeting/MAR13/Session/A15.6>

- *Probing boundary magnetization through exchange bias in heterostructures with competing anisotropy*, Yi Wang, Ch. Binek
<http://meeting.aps.org/Meeting/MAR13/Event/182159>
- *Growth and Characterization of Magnetolectric Fe_2TeO_6 Thin Films*, J. Wang, J. Colon Santana, N. Wu, P.A. Dowben, Ch. Binek
<http://meeting.aps.org/Meeting/MAR13/Event/187445>
- March Meeting of the American Physical Society, Boston, Massachusetts, February 27-March 2, 2012,
 - *The Structure of High Polarization Surface of the Antiferromagnet Cr_2O_3* , Ning Wu, Xin Zhang, Keisuke Fukutani, Xi He, Christian Binek, Peter Dowben, Wai-Ning Mei, Zhaoxian Yu
 - *Tailored inter and intra layer exchange coupled superlattices for optimized magnetocaloric effect*
Tathagata Mukherjee, S. Michalski, R. Skomski, D.J. Sellmyer, Ch. Binek
 - *Growth and Characterization of Magneto electric Fe_2TeO_6*
Junlei Wang, Peter Dowben, Christian Binek
 - *Morphology and Magnetism of Atomically Thin Layers of Chromia -- An STM Investigation*
Xumin Chen, Donna Kunkel, Geoffrey Rojas, Xi He, Christian Binek, Axel Enders
- March Meeting of the American Physical Society, Dallas Texas March 21-24, 2011,
 - *Imaging and Electric Control of Boundary Magnetization and Exchange Bias in Chromia and Chromia/CoPd*,
Xi He, Christian Binek, Yi Wang, Aleksander Wysocki, Uday Lanke, Takashi Komesu, N. Wu, A. Caruso, E. Vescovo, K. D. Belashchenko, P. A. Dowben
 - *Magnetism of Fe nanostructure on BTO film*,
J. Kim, S. Yang, J.S Kim, G. Rojas, R. Skomski, M. Bode, A. Bhattacharya, T. Santos, N. Guisinger, H. Lu, A. Gruverman, C. Binek, V. Sessi, J. Honolka, A. Enders
 - *Thermodynamics and magnetocaloric properties of Fe/Cr superlattices*,
T. Mukherjee, S. Michalski, R. Skomski, D.J. Sellmyer, Ch. Binek
 - *Correlation between bias fields and magnetoresistance in CoPt biased NiFe/Ta/NiFe heterostructures*,
Yi Wang, Xi He, T. Mukherjee, S. Sahoo, M. Fitzsimmons, Ch. Binek
 - *Pulsed laser deposition of $Cr_{2-x}Fe_xTeO_6$ thin films*,
J. Wang, K.D. Belashchenko, P.A. Dowben, Ch. Binek
- March Meeting of the American Physical Society, Portland, Oregon March 15-19, 2010,
 - *Robust isothermal electric switching of interface magnetization: A route to voltage-controlled spin electronics*,
Xi He, Christian Binek, Yi Wang, Siqi Shi, N. Wu, A. Caruso, E. Vescovo, K. D. Belashchenko, P. A. Dowben
 - *Correlation between bias fields and magnetoresistance in CoPt biased NiFe/Ta/NiFe heterostructures*,
Yi Wang, Xi He, S. Sahoo, Ch. Binek
 - *Piezoelectric tuning of exchange bias from negative to positive bias fields*,
S. Polisetty, Ch. Binek, S. Sahoo
 - *Magnetocaloric properties of Co/Cr superlattices*,
T. Mukherjee, R. Skomski, D.J. Sellmyer, Ch. Binek
 - *Aging in magnetic superlattices*,
T. Mukherjee, M. Pleimling, Ch. Binek

- 20th International Colloquium on Magnetic Films and Surfaces Berlin, July 20–24, 2009, *Electrically controlled magnetism*, Ch. Binek, Xi He, Yi Wang, N. Wu, S. Polisetty, K. Belashchenko, P. Dowben
- Fifth International Nanotechnology Conference on Communications and Cooperation (INC5) May 18th – 21st, 2009 at the California NanoSystems Institute at UCLA, Los Angeles, California
 - *University of Nebraska's Materials Research Science and Engineering Center (MRSEC)*, Ch. Binek, A. Enders, A. Gruverman, A. Sokolov, and E. Y. Tsymbal
 - *Electrically controlled magnetism*, Ch. Binek, Xi He, Yi Wang, N. Wu, S. Polisetty, K. Belashchenko, P. Dowben
- American Physical Society March meeting, March 16-20, 2009, Pittsburgh, Pennsylvania
 - *Fingerprints of surface magnetism in Cr₂O₃ based exchange bias heterostructures*, Xi He, Yi Wang, and Ch. Binek
 - *Correlation between bias fields and magnetoresistance in CoPt biased FeNi/Ta/FeNi GMR heterosystems*, Yi Wang, S. Sahoo, W. Echtenkamp, and Ch. Binek
 - *Aging in Co/Cr Superlattices*, T. Mukherjee, M. Pleimling, and Ch. Binek
 - *Coercivity enhancement in (Co/CoO)_n superlattices*, S. Polisetty and Ch. Binek
- 53rd Annual Conference on Magnetism and Magnetic Materials, November 10-15, 2008 Austin, Texas
 - *Temperature dependence of the training effect in exchange coupled all ferromagnetic bilayers*, S. Polisetty; S. Sahoo; A. Berger; Ch. Binek
 - *Magnetocaloric properties of Co/Cr superlattices*, T. Mukherjee; S. Sahoo; R. Skomski; D. J. Sellmyer; Ch. Binek
 - *Surface ferromagnetism in antiferromagnetic Cr₂O₃ thin films*, X. He; Y. Wang; N. Wu; S. Sahoo; K. Belashchenko; A. Caruso; E. Vescovo; P. Dowben; A. Gruverman; Ch. Binek
- Materials Research Society 2008 Fall Meeting, December 1-5, 2008, Boston, MA
 - *Temperature dependence of the training effect in exchange coupled all ferromagnetic bilayers*, S. Polisetty; S. Sahoo; A. Berger; Ch. Binek
 - *Magnetocaloric properties of Co/Cr superlattices*, T. Mukherjee; S. Sahoo; R. Skomski; D. J. Sellmyer; Ch. Binek
 - *Surface ferromagnetism in antiferromagnetic Cr₂O₃ thin films*, X. He; Y. Wang; N. Wu; S. Sahoo; K. Belashchenko; A. Caruso; E. Vescovo; P. Dowben; A. Gruverman; Ch. Binek
- American Physical Society March meeting, March 10-14, 2008, New Orleans, Louisiana
 - Talk 1: *Ferroelectric control of magnetism in BaTiO₃/Fe heterostructures*
S. Sahoo, S. Polisetty, C.-G. Duan, S. S. Jaswal, E. Y. Tsymbal, and Ch. Binek
 - Talk 2: *Scaling behavior of the exchange-bias training effect*
S. Polisetty, S. Sahoo, and Ch. Binek

- Talk 3: *Thermodynamics of Co/Cr superlattices*
T. Mukherjee, S. Sahoo, R. Skmoski, D.J. Sellmyer, and Ch. Binek
- Talk 4: *Magnetoelectric effect in Cr₂O₃ thin films*
Xi He, Yi Wang, S. Sahoo, Ch. Binek
- Poster: *Optimization of MOKE Setups: Analyzing Experimental Assemblies Using Jones Matrix Formalism*
S. Polisetty, J. Scheffler, S. Sahoo, and Ch. Binek
- Poster: *Exchange biased anisotropic magnetoresistance in Co/CoO bilayer*
S. Sahoo, S. Polisetty, Yi Wang, T. Mukherjee, Xi He, and Ch. Binek

- 54th Midwest Conference on Solid State Physics, October 6-7, 2007, University of Nebraska-Lincoln, NE 68588, USA
 - *Scaling behaviour of Exchange bias training effect*,
S. Polisetty, S. Sahoo and Ch. Binek (**won the best poster award**)
 - *Isothermal field tuning and quenching of exchange bias and its training in epitaxial Fe/Cr₂O₃/Fe trilayer*,
T. Mukherjee, S. Sahoo, K. Belashchenko, and Ch. Binek
 - *Magnetocaloric Properties of Co/Cr Multilayers*,
T. Mukherjee, S. Sahoo, R. Skomski, D. Sellmyer, and Ch. Binek
 - *Ferroelectric Control of Magnetism in BaTiO₃/Fe Heterostructures*,
Srinivas Polisetty, Sarbeswar Sahoo, Chun-Gang Duan, Sitaram S. Jaswal, Evgeny Y. Tsymlal, and Christian Binek
 - *Magnetic and magnetoelectric properties of epitaxial Cr₂O₃ thin films*,
Xi He, Yi Wang, Sarbeswar Sahoo, and Christian Binek

- Sigma-Xi participation:
 - Magnetoelectric Thin Films for Electrically Controlled Exchange Bias in Spintronics Application*,
X. He, Y. Wang, T. Mukherjee, S. Polisetty, S. Sahoo, Ch. Binek
 - Magnetic Properties of Epitaxial Cr/Cr₂O₃/Cr*,
T. Mukherjee, S. Sahoo and Ch. Binek

- APS March meeting, March 5-9, 2007, Denver, Colorado
 - Dynamic enhancement of the exchange bias training effect*
 - Exchange bias training effect in Co/CoO heterostructures with variation of the ferromagnetic film thickness*
 - Magnetic Properties of Epitaxial Cr/Cr₂O₃/ Cr Multilayers*
 - Piezomagnetism in Epitaxial Cr₂O₃ Thin Films*
 - Magnetoelectric thin films for electrically controlled exchange bias in spintronic applications*

- APS March Meeting 2007, Denver, CO
 - *Magnetic properties of epitaxial Cr₂O₃ multilayers*
 - *Piezomagnetism in epitaxial Cr₂O₃ thin films*
 - *Magnetoelectric thin films for electrically controlled exchange bias in spintronic applications*
 - *Exchange bias training effect in Co/CoO heterostructures with variation of the ferromagnetic film thickness*

- 53rd Midwest Solid State Conference in Kansas City

- *Dynamic enhancement of the exchange bias effect*,
S. Sahoo, S. Polisetty, A. Berger and Ch. Binek (poster)
- *Piezomagnetism in Epitaxial Cr₂O₃ Thin Films*,
Y. Wang, S. Sahoo, T. Mukherjee, X. He, and Ch. Binek (poster),
- *Exchange Bias Training Effect in Coupled All Ferromagnetic Bilayer Structures*,
Srinivas Polisetty, He Xi and Christian Binek
- AVS , November 2006, San Francisco, CA “*All ferromagnetic exchange bias systems*”
(presented by A. Berger)
- APS March Meeting 2006, Baltimore, MD
 - *Exchange bias training effect in coupled all ferromagnetic bilayer structures*
 - *Electrically controlled exchange bias for spintronic applications*
 - *Nonextensivity in magnetic nanocluster ensembles*
- APS March Meeting 2005 , Los Angeles, CA “*Temperature Dependence of the Training Effect in Exchange Bias Heterostructures*”
- MMM 04 conference Jacksonville, Florida November 2004 “*Electrically controlled Exchange Bias for Spintronic Applications*”
- International Conference on Magnetism, Rom (Italy) 2003 “*Extrinsic Control of the Exchange Bias*”
- Symposium of the Graduierten Kolleg: Struktur und Dynamik heterogener Systeme, Duisburg (Germany), November 2002 “*Ferromagnetic Fe-clusters in antiferromagnetic FeCl₂ environment*”
- 4th International Symposium on Metallic Multilayers, Aachen Juni 2001
 - *Exchange bias of FeF₂/CoPt and Fe_{0.5}Zn_{0.5}F₂/Fe heterostructures*
 - *Magnetic states of discontinuous Co₈₀Fe₂₀Al₂O₃ multilayers*
- WE-Heraeus Seminar on Spin Dynamics, Physikzentrum Bad Honnef Januar 2001
Freezing field dependence of the exchange bias in uniaxial FeF₂ -CoPt heterosystems with perpendicular anisotropy
- The 8th Joint MMM-Intermag Conference, San Antonio (Texas USA) Januar 2001
Magnetic states of granular layered CoFe/Al₂O₃ system (nicht persönlich vertreten)
- International Conference on Magnetism, Recife (Brasilien) 2000
 - *Exchange bias in FeF₂ -CoPt heterosystems with perpendicular anisotropy*
 - *ac susceptibility studies of discontinuous Co₈₀Fe₂₀Al₂O₃*
- International Symposium on Structure and Dynamics of Heterogeneous Systems, Duisburg August 2000
Dynamic behavior of interacting superparamagnetic particles in discontinuous magnetic multilayers
- International Symposium on Structure and Dynamics of Heterogeneous Systems, Duisburg Februar 1999
Two-dimensional behavior of the sublattice magnetization in three dimensional Ising antiferromagnets

- 41th Annual Conference on Magnetism & Magnetic Materials, Atlanta (Georgia USA) 1996
Metamagnetic domains and dynamic fluctuations in FeBr₂
- The 6th Joint MMM-Intermag Conference, Albuquerque (New Mexico) Juni 1994
- *Interface alloying and magnetic properties of Fe/Rh multilayers (nicht persönlich vertreten)*
- 19th International Meeting on Statistical Physics, Smolenice (Slovakia) April 1994
- *Field induced Griffiths phase in FeCl₂*
- International Conference on Magnetism, Warschau (Polen) August 1994
- *Transient spin structures at the antiferromagnetic-to-paramagnetic phase boundary of FeBr₂*
- *Crossover from transient spin structures to the field-induced Griffiths phase of FeBr₂*

DPG (German Physical Society) spring meetings

- DPG-Frühjahrstagung, Regensburg, Germany March 6-11, 2016
Compositional tuning of boundary magnetization properties in epitaxial Cr_{2-x}Al_xO₃ (0001) films, Lorenzo Fallarino, Christian Binek, and Andreas Berger
<http://www.dpg-verhandlungen.de/year/2016/conference/regensburg/part/ma/session/15/contribution/1>
- Regensburg 1990
Ramanspektroskopische Untersuchungen der Spin-Phonon-Wechselwirkung in Fe_{1-x}Zn_xF₂
- Regensburg 1992
Lichtbeugung an Domänen und domänenartigen Fluktuationen des einachsigen Antiferromagneten FeCl₂
- Regensburg 1993
Critical Dynamics in FeCl₂:Mg
- Münster 1994
- *FeBr₂: Ein Spin-Flop-Antiferromagnet?*
- *Feldinduzierte Griffiths-Phase in FeCl₂*
- *Relaxation der feldinduzierten thermoremanenten Magnetisierung im verdünnten Antiferromagneten Fe_{1-x}Zn_xF₂*
- Berlin 1995
- *Dynamisches kritisches Verhalten, feldinduzierte Griffiths-Phase und Domänenwandsuszeptibilität im Zufallfeld-Ising-System Fe_{0.47}Zn_{0.53}F₂*
- *The local spin structure in external field of FeBr₂*
- Regensburg 1996
Magnetische Neutronenstreuung an quasikritischen Fluktuationen der feldinduzierten Griffiths-Phase in FeCl₂

- Münster 1997
 - *Metamagnetische Domänen und dynamische Fluktuationen in FeBr₂*
 - *Magnetische spezifische Wärmekapazität des metamagnetischen Antiferromagneten FeBr₂*
 - *Ordnungs- und Unordnungskinetik feldinduzierter antiferromagnetischer Domänen in Rb₂Co_{0.85}Mg_{0.15}F₄*

- Regensburg 1998
 - *Phasenübergänge und Fluktuationen im Metamagneten Fe_{1-x}Mg_xBr₂*
 - *Konzentrationsgetriebener Übergang des 2d-Ising Antiferromagneten Rb₂Co_{1-x}Mg_xF₄ vom reinen Verhalten zum Ising-System mit zufälligem Austausch*

- Münster 1999
 - *Magnetische Eigenschaften flammensynthetisch erzeugter γ -Fe₂O₃ Nanopartikel*
 - *Zweidimensionales Verhalten der Untergittermagnetisierung in Ising-Metamagneten*
 - *Ortsaufgelöste thermomodulierte SQUID-Suszeptometrie an Metamagneten*

- Regensburg 2000
 - *Exchange Bias in uniaxialen FeF₂-CoPt Heteroschichtsystemen mit senkrechter Anisotropie*
 - *Neutronenstreuuntersuchungen von transversalen Magnetisierungskomponenten im Metamagneten FeBr₂*
 - *New methods of magnetic heat capacity measurements based on SQUID magnetometry*

- Hamburg 2001
 - *Magnetic critical behavior of dipolar interacting ferromagnetic nanoparticles in discontinuous Co₈₀Fe₂₀/Al₂O₃ multilayers*
 - *Exchange Bias in magnetischen Isolator/Metall-Heteroschichtstrukturen*

- Regensburg 2002
 - *Verdünnunginduzierte Überhöhung der Blockingtemperatur in Exchange Bias-Heterostrukturen*
 - *Exchange Bias epitaktischer und diskontinuierlicher Metall/Isolator-Heterostrukturen*

Organizing Symposia, conferences and workshops

- Symposium “*Nanomagnetism: Finding tools for a problem and problems for a tool*”, University of Nebraska-Lincoln, December 11-12, 2019 with invited speakers from NNCI sites Univ. of Kentucky, Univ. of Minnesota, and Univ. of California-SD.
<https://ncmn.unl.edu/ncmn-nnf-symposium-registration>

- Symposium “*Emergent Quantum Materials and Technologies*”, University of Nebraska-Lincoln, March 26-27, 2020 with 5 invited speakers and about 100 participants
<https://ncmn.unl.edu/equate-test>

List of publications

1. Ather Mahmood, Jamie L. Weaver, Syed Qamar Abbas Shah, Will Echtenkamp, Jeffrey W. Lynn, Peter A. Dowben, and Christian Binek, Adv. Physics Res., 2300061 (2023)
<https://doi.org/10.1002/apxr.202300061>
Post Deposition Interfacial Néel Temperature Tuning in Magnetoelectric B:Cr₂O₃
2. Syed Q. A. Shah, Ather Mahmood, Arun Parthasarathy, and Christian Binek, Phys. Rev. B **108**, 054437 (2023). Editor's Suggestion.
Search for magnetoelectric monopole response in Cr₂O₃ powder
3. Xiaoshan Xu, Christian Binek
Encyclopedia of Materials: Electronics, Volume 1, 2023, Pages 633-649,
<https://doi.org/10.1016/B978-0-12-819728-8.00084-X>
Magnetoelectric Multiferroic Materials
4. Takashi Komesu, Will Echtenkamp, Christian Binek and Peter A Dowben, J. Phys.:Condens. Matter, **35**, 275801(2023).
The spin polarization of palladium on magneto-electric Cr₂O₃
5. Adam Erickson, Syed Qamar Abbas Shah, Ather Mahmood, Ilja Fescenko, Rupak Timalina, Christian Binek and Abdelghani Laraoui, RSC Adv. **13**, 178-185 (2023).
Nanoscale imaging of antiferromagnetic domains in epitaxial films of Cr₂O₃ via scanning diamond magnetic probe microscopy
6. Kaushik Sarkar, Surabhi Shaji, Suchit Sarin, Jeffrey E. Shield, Christian Binek, and Dhananjay Kumar, J. Appl. Phys. **132**, 193906 (2022).
Large refrigerant capacity in superparamagnetic iron nanoparticles embedded in a thin film matrix
7. Archit Dhingra¹, Xuedong Hu, Mario F Borunda, Joseph F Johnson, Christian Binek, Jonathan Bird, Alpha T N'Diaye, Jean-Pascal Sutter, Emilie Delahaye, Eric D Switzer, Enrique del Barco, Talat S Rahman and Peter A Dowben, J. Phys. Condens. Matter **34**, 441501 (2022).
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8. R. Skomski, B. Balasubramanian, A. Ullah, C. Binek, and D. J. Sellmyer, AIP Advances **12**, 035341 (2022).
Berry-phase interpretation of thin-film micromagnetism
9. Keke He, Bilal Barut, Shenchu Yin, Michael D. Randle, Ripudaman Dixit, Nargess Arabchigavkani, Jubin Nathawat, Ather Mahmood, Will Echtenkamp, Christian Binek, Peter A. Dowben, and Jonathan P. Bird, Adv. Mater. **2105023** (2022).
Graphene on Chromia: A System for Beyond-Room-Temperature Spintronics
10. Valery Shevchenko, Valery Bliznyuk, Mariana Gumenna, Nina Klimenko, Alexandr Stryutsky, Junlei Wang, Christian Binek, Margarita Chernyakova, and Konstantin Belikov, Macromol. Mater. Eng., **306**, 2100085 (2021).

Coordination Polymers Based on Amphiphilic Oligomeric Silsesquioxanes and Transition Metal Ions (Co²⁺, Ni²⁺): Structure and Stimuli-Responsive Properties

11. Ather Mahmood, Will Echtenkamp, Mike Street, Jun-Lei Wang, Shi Cao, Takashi Komesu, Peter A. Dowben, Pratyush Buragohain, Haidong Lu, Alexei Gruverman, Arun Parthasarathy, Shaloo Rakheja, and Christian Binek, NATURE COMMUNICATIONS | (2021) 12:1674
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12. E Y Vedmedenko, R K Kawakami, D D Sheka, P Gambardella, A Kirilyuk, A Hirohata, C Binek, O Chubykalo-Fesenko, S Sanvito, B J Kirby, J Grollier, K Everschor-Sitte, T Kampfrath, C-Y Youand A Berger, J. Phys. D: Appl. Phys. **53**, 453001(2020).
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14. N Sharma, J P Bird, Ch Binek, P A Dowben, D Nikonov, and A Marshall, Semicond. Sci. Technol. **35**, 073001(2020).
Evolving magneto-electric device technologies
15. P.A. Dowben, D. E. Nikonov, A. Marshall, and Ch. Binek, Appl. Phys. Lett. **116**, 080502 (2020).
Magnetolectric antiferromagnetic spin-orbit logic devices
16. S.Shaji, N.R. Mucha, P. Giri, C. Binek, D. Kumar, AIP Advances **10**, 025222 (2020).
Magnetic and magnetocaloric properties of Fe₂Ta thin films
17. S. Shaji, N.R. Mucha, A.K. Majumdar, C. Binek, A. Kebede, A ; D. Kumar, J. Magn. Magn. Mater. **489**, 165446 (2019).
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22. Peter A. Dowben, Christian Binek, Dmitri Nikonov
Proc. of the International Symposium on VLSI Technology, Systems and Application (VLSI-TSA), Hsinchu, Taiwan (Apr. 16-19, 2018).
Nonvolatile magneto-electric field effect transistors for spintronic memory and logic
23. Panupong Jaipan, Chandra Nannuri, Nikhil Reddy Mucha, Mayur P. Singh, Zhigang Xu, Adele Moatti, Jay Narayan, Svitlana Fialkova, Ruben Kotoka, Sergey Yarmolenko, Onome Scott-Emuakpor, Christian Binek, Abebe Kebede, Dhananjay Kumar, *Mater. Focus* **7**, 720 (2018)
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Magnetization at the interface of Cr₂O₃ and paramagnets with large stoner Susceptibility
30. U. Singh, W. Echtenkamp, M. Street, Ch. Binek, S. Adenwalla, *Adv. Funct. Mater* **26**, 7470 (2016).

Local Writing of Exchange Biased Domains in a Hetero-structure of Co/Pd Pinned by Magnetoelectric Chromia

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The surface stability of Cr₂O₃ (0001)
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Spin relaxation time dependence on optical pumping intensity in GaAs:Mn,
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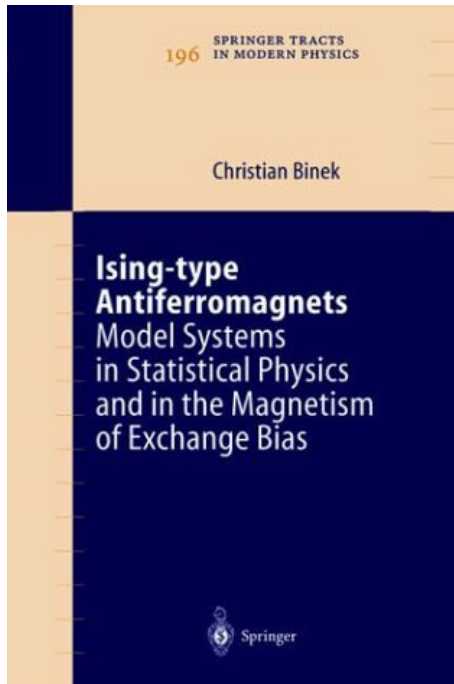
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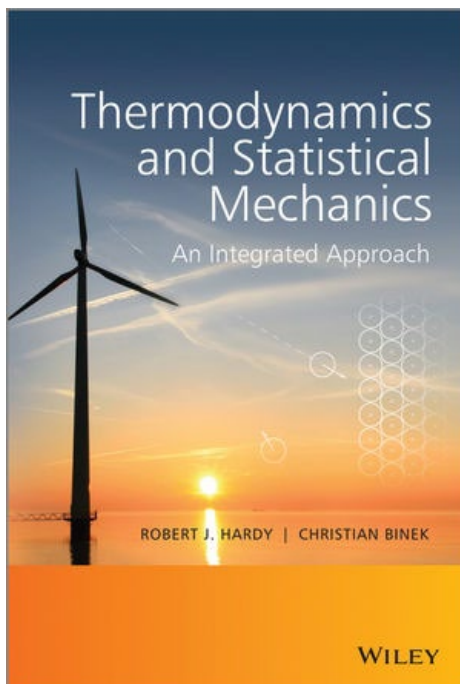
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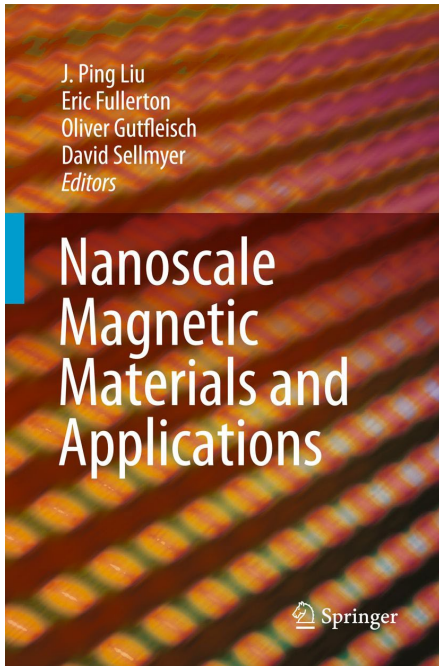
Ising-type antiferromagnets: Model systems in statistical physics and the magnetism of exchange bias

Co-authored books

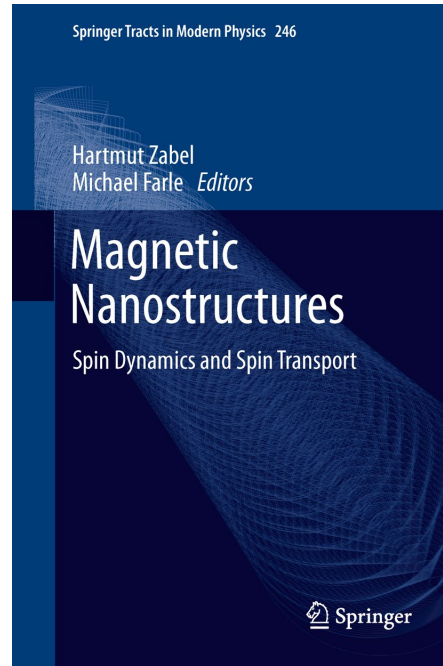


ISBN: 978-1-118-50100-9, 510 pages, May 2014

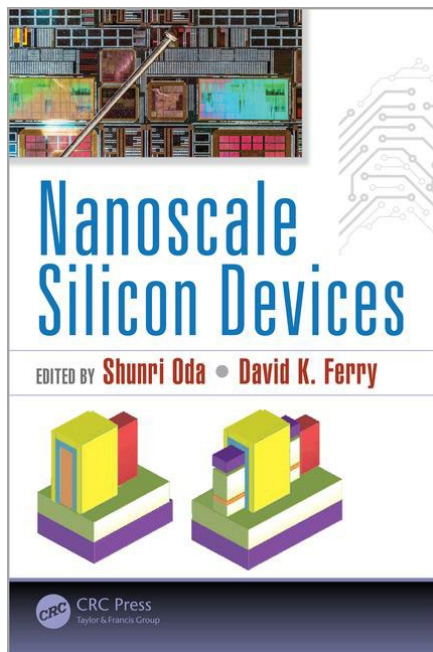
Book chapters



“Tunable Exchange Bias Effects”,
Chapter 6, page 159-179.



“Multiferroic and magnetoelectric materials”,
Chapter 5, page 163-187.



“Potential of Nonvolatile Magnetoelectric Devices for
Spintronic Applications”
Chapter 11, page 255 - 278

Patents

Method for refrigeration through voltage-controlled entropy change, involves generating change in temperature of ferromagnetic materials, in response to generating strain in ferromagnetic materials attached to piezoelectric materials

Patent Number(s): US2014007592-A1
 Inventor(s): BINEK C
 Patent Assignee Name(s) and Code(s): BINEK C(BINE-Individual)
 Derwent Primary Accession Number: 2014-A74862 [06]



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/161,888	05/23/2016	Christian Binek	24742-0065002	1737

TITLE OF INVENTION: REFRIGERATION THROUGH VOLTAGE-CONTROLLED ENTROPY CHANGE

Magneto-electric spin field effect transistor used for non-volatile memory device, consists of layer of magneto-electric gate dielectric, thin film of channel material, and source and drain disposed in electrical contact with thin film

Patent Number(s): US2014231888-A1
 Inventor(s): KELBER J A, BINEK C, BOWDEN P A, BELASHCHENKO K
 Patent Assignee Name(s) and Code(s): QUANTUM DEVICES LLC (QUAN-Non-standard)



(12) **United States Patent**
 Kelber et al.

(10) **Patent No.:** US 9,379,232 B2
 (45) **Date of Patent:** Jun. 28, 2016

(54) **MAGNETO-ELECTRIC VOLTAGE CONTROLLED SPIN TRANSISTORS**

(71) Applicants: **University of North Texas**, Denton, TX (US); **Quantum Devices, LLC**, Potomac, MD (US)

(72) Inventors: **Jeffrey A. Kelber**, Plano, TX (US); **Christian Binek**, Lincoln, NE (US); **Peter Arnold Bowden**, Crete, NE (US); **Kirill Belashchenko**, Lincoln, NE (US)

(73) Assignee: **QUANTUM DEVICES, LLC**, Rockville, MD (US)

(52) **U.S. CL**
 CPC **H01L 29/78** (2013.01); **G11C 11/161** (2013.01); **G11C 11/5607** (2013.01); **H01F 10/002** (2013.01); **H01L 29/517** (2013.01); **H01L 29/66984** (2013.01); **B82Y 10/00** (2013.01); **H01F 10/3268** (2013.01); **H01L 29/1606** (2013.01)

(58) **Field of Classification Search**
 USPC 257/4, 24, 194, 213, 295
 See application file for complete search history.

(56) **References Cited**
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Magnetic Spin Valve With a Magnetoelectric Element

Patent Inventorship Correction US patent 7,358,846



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United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
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Patent No. 7358846
Issued Date: 15 April, 2008
Appl. No: 11/444,675
Filed.: 01 June 2006

PART (A) RESPONSE FOR CERTIFICATES OF CORRECTION

This is a decision on the Certificate of Correction request filed 04 August 2015.

The request for issuance of Certificate of Correction for the above-identified correction(s) under the provisions of 37 CFR 1.322 and/or 1.323 is hereby:

(Check one)

Approved Approved in Part Denied

Comments:

PART (B) PETITION UNDER 37 CFR 1.324 OR 37 CFR 1.48

This is a decision on the petition filed 15 June 2009 to correct inventorship under 37 CFR 1.324.

This is a decision on the request under 37 CFR 1.48, petition filed In view of the fact that the patent has already issued, the request under 37 CFR 1.48 has been treated as a petition to correct inventorship under 37 CFR 1.324.

The petition is hereby: Granted Dismissed

The patented filed is being forwarded to Certificate of Corrections Branch for issuance of a certificate naming only the actual inventor or inventors.

/Amy Cohen Johnson/
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Certificates of Correction Branch email: CustomerServiceCxC@uspto.gov CxC Central Phone Number: (703) 756-1814

Magnetoelectric chromia having increased critical temperature

Inventor(s): BINEK C, BOWDEN P A, BELASHCHENKO K, STREET MIKE

Patent Number : US 9,718,700 B2

Date of Patent: August 2017



(12) **United States Patent**
Binek et al.

(10) **Patent No.:** US 9,718,700 B2
(45) **Date of Patent:** *Aug. 1, 2017

(54) **MAGNETOELECTRIC CHROMIA HAVING INCREASED CRITICAL TEMPERATURE**

(71) Applicant: **Board of Regents of the University of Nebraska, Lincoln, NE (US)**

(72) Inventors: **Christian Binek, Lincoln, NE (US); Peter Bowden, Crete, NE (US); Kirill Belashchenko, Lincoln, NE (US); Aleksander Wysocki, Ames, IA (US); Sal Mu, Lincoln, NE (US); Mike Street, Lincoln, NE (US)**

(73) Assignee: **Board of Regents of the University of Nebraska, Lincoln, NE (US)**

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 108 days.
This patent is subject to a terminal disclaimer.

(21) Appl. No.: **14/629,178**

(22) Filed: **Feb. 23, 2015**

(65) **Prior Publication Data**
US 2015/0243414 A1 Aug. 27, 2015

Related U.S. Application Data

(66) Provisional application No. 61/943,528, filed on Feb. 24, 2014.

(51) **Int. Cl.**
H01F 1/01 (2006.01)
C01G 37/027 (2006.01)
H01F 1/00 (2006.01)
H01L 43/08 (2006.01)
H01L 43/12 (2006.01)
H01F 10/00 (2006.01)
H01F 10/22 (2006.01)

(52) **U.S. CL**
CPC **C01G 37/027** (2013.01); **H01F 10/009** (2013.01); **H01F 10/002** (2013.01); **H01L 43/08** (2013.01); **H01L 43/12** (2013.01); **C01P 2002/50** (2013.01); **C01P 2002/72** (2013.01); **H01F 10/3268** (2013.01)

(58) **Field of Classification Search**
CPC H01L 20/82; H01L 45/02; H01L 45/08; H01L 27/228; H03K 19/173; H03K 19/16
See application file for complete search history.

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*Effect of substitutional doping on the Néel temperature of Cr₂O₃" by Sai Mu, et al., in American Physical Society, Physical Review B 87, Feb. 28, 2013, 11 pages.

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Primary Examiner — Carol M. Koslow
(74) **Attorney, Agent, or Firm** — Islem IP Law, L.L.P.

(57) **ABSTRACT**
A magnetoelectric composition of boron and chromia is provided. The boron and chromia alloy can contain boron doping of 1%-10% in place of the oxygen in the chromia. The boron-doped chromia exhibits an increased critical temperature while maintaining magnetoelectric characteristics. The composition can be fabricated by depositing chromia in the presence of borane. The boron substitutes oxygen in the chromia, enhancing the exchange energy and thereby increasing Néel temperature.

15 Claims, 11 Drawing Sheets

Magnetoelectric Logic Devices using Semiconductor Channel with Large Spin-Orbit Coupling

Inventor(s):

Dr. Dmitri Nikonov, Intel

Prof. Christian Binck, University of Nebraska at Lincoln

Prof. Xia Hong, University of Nebraska at Lincoln

Prof. Jonathan P. Bird, University at Buffalo

Prof. Kang Wang, University of California – Los Angeles

Prof. Peter A. Dowben, University of Nebraska at Lincoln

Patent Number: US 10,361,292 B2

Date of Patent: July 23, 2019



US010361292B2

(12) **United States Patent**
Nikonov et al.

(10) **Patent No.:** **US 10,361,292 B2**

(45) **Date of Patent:** **Jul. 23, 2019**

(54) **MAGNETO-ELECTRIC LOGIC DEVICES USING SEMICONDUCTOR CHANNEL WITH LARGE SPIN-ORBIT COUPLING**

(51) **Int. Cl.**
G11C 11/00 (2006.01)
H01L 29/66 (2006.01)

(Continued)

(71) Applicant: **Board of Regents of the University of Nebraska, Lincoln, NE (US)**

(52) **U.S. Cl.**
CPC **H01L 29/66984** (2013.01); **B82Y 10/00** (2013.01); **G11C 11/14** (2013.01);
(Continued)

(72) Inventors: **Dmitri E. Nikonov, Beaverton, OR (US); Christian Binck, Lincoln, NE (US); Xia Hong, Lincoln, NE (US); Jonathan P. Bird, Buffalo, NY (US); Kang L. Wang, Los Angeles, CA (US); Peter A. Dowben, Crete, NE (US)**

(58) **Field of Classification Search**
CPC ... H01L 29/66984; H01L 29/08; H01L 29/24; H01L 29/423; G11C 11/14;
(Continued)

(73) Assignees: **INTEL CORPORATION, Santa Clara, CA (US); THE RESEARCH FOUNDATION FOR THE STATE UNIVERSITY OF NEW YORK, Amherst, NY (US); BOARD OF REGENTS OF THE UNIVERSITY OF NEBRASKA, Lincoln, NE (US); THE REGENTS OF THE UNIVERSITY OF CALIFORNIA, Oakland, CA (US)**

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Primary Examiner — Toan K Le

(74) *Attorney, Agent, or Firm* — Talem IP Law, LLP

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(57) **ABSTRACT**

Antiferromagnetic magneto-electric spin-orbit read (AF-SOR) logic devices are presented. The devices include a voltage-controlled magnetoelectric (ME) layer that switches polarization in response to an electric field from the applied voltage and a narrow channel conductor of a spin-orbit coupling (SOC) material on the ME layer. One or more sources and one or more drains, each optionally formed of ferromagnetic material, are provided on the SOC material.

(21) Appl. No.: **15/898,457**

(22) Filed: **Feb. 17, 2018**

(65) **Prior Publication Data**

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Related U.S. Application Data

(60) Provisional application No. 62/460,164, filed on Feb. 17, 2017.

20 Claims, 9 Drawing Sheets

Hall Bar Device for Memory and Logic Applications

Inventor(s):
 Christian Binek
 Ather Mahmood
 Will Echtenkamp



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NOTICE OF ALLOWANCE AND FEE(S) DUE

129380 7590 09/24/2021
 Talem IP Law, LLP
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 Gainesville, FL 32635-8880

EXAMINER

LE, TOAN K

ART UNIT	PAPER NUMBER
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/988,085	08/07/2020	Christian BINEK	MAR-UNL-105	1253

TITLE OF INVENTION: HALL BAR DEVICE FOR MEMORY AND LOGIC APPLICATIONS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	\$1200	\$0.00	\$0.00	\$1200	12/24/2021