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PROF. KANNAN M. KRISHNAN

Curriculum Vitae

Education

- 1984 Ph.D., Materials Science (Physics & Mathematics - Minors) UC, Berkeley
1980 M.S., Materials Science, State University of New York, Stony Brook.
1978 B. Tech., Mechanical Engineering, IIT Kanpur, India.

Professional Experience

Permanent Positions/Appointments

- 2001- Professor, University of Washington, Seattle
2001-2006 Campbell Chair Professor, Department of Materials Science & Engineering
2003- Adjunct Professor, Department of Physics, University of Washington.
2010- Associate Faculty Member, South Asian Studies Program
- 1984-2001 University of California, Berkeley,
Lawrence Berkeley National Laboratory
1998-2001: Senior Scientist, Materials Sciences Division
1990-2001: Principal Investigator, Materials Sciences Division
1989-1998: Staff Scientist III, Materials Sciences Division
1986-1989: Staff Scientist II & Group Leader – Analytical Electron Microscopy,
National Center For Electron Microscopy
1984-1986: Post-doctoral Fellow, National Center For Electron Microscopy
1996-1998: Lecturer, Applied Science and Technology Program
1980-1984: Graduate Student Research Assistant, Department of Materials Sciences & Engineering,

Visiting & Term Appointments

- 2016/7 *June/July*: Alexander von Humboldt Visiting Professor, Department of Physics, University of Duisburg-Essen, Germany
August: Alexander von Humboldt Visiting Professor, Radiology Department, University Klinikum-Eppendorf, Hamburg, Germany
- 2016 *January*: Brahm Prakash Visiting Professor, Indian Institute of Science, Bangalore, India
2010 *September-October*: Fulbright Specialist, University of Alexandria, Egypt
2009 *Feb-May*: Visiting Professor, Tohoku University
2006-2008 Professor-at-Large, Institute of Advanced Study, University of Western Australia, Perth, Australia
- 2005 *September*: Visiting Professor, Indian Institute of Science, Bangalore, India. Materials Research Center
April-May: Visiting Professor, Institute for Micro- and Nanotechnologies, Danish Technical University, Copenhagen, Denmark.
- 2004 *September*: Visiting Professor, Indian Institute of Science, Bangalore, India. Materials Research Center
- 2003 *June*: JSPS Visiting Professor, Institute for Multidisciplinary Research in Advanced Materials, Tohoku University, Sendai, Japan
- 1993-1994 Visiting Senior Researcher, Central Research Laboratory, Hitachi Ltd., Tokyo, Japan, Information Storage Research Center

1991 Feb-April: FPSP Visiting Professor, Universidade de Sao Paulo, Department of Physics, Sao Paulo, Brazil

Other Synergistic Activities

2017- Member, *Technical Committee*, IEEE Magnetics Society
2014- Member, *Fellows Evaluation Committee*, IEEE Magnetics Society
2014-2017 Member, Editorial Board, *Journal of Magnetism and Magnetic Materials*
2013 Member, *Organizing Committee*, 3rd International Workshop on Magnetic Particle Imaging, Berkeley, CA, March 2013.
2012 Member, *Organizing Committee*, 2nd International Workshop on Magnetic Particle Imaging, Lübeck, Germany, May 2012
2011 Organizer, Special Symposium on Biomedical Imaging, 56th Magnetism and Magnetic Materials Conference, Arizona, October 2011
2011-2014 Member, Fetzer Institute Advisory Council on the Engineering Professions
2011-2013 Member, Administrative Committee, IEEE Magnetics Society (elected by the worldwide membership of the society)
2010- Associate Editor, *Medical Physics*
2010-2014 Member, Editorial Board, *IEEE Magnetics Letters*
2009- Member, International Advisory Board, International Symposium on Advanced Magnetic Materials and Applications (2010)
2009- Member, International Advisory Board, Korean Magnetic Society
2009- Member, International Review Commission, Global COE Program, Tohoku University, Japan
2007- Faculty Mentor, UW-Amgen Undergraduate Scholars Program
2006 Member, International Expert Panel, Canada Fund for Innovation Competition for major Materials Science Initiatives
2004- Member of the Editorial Board, *J. Materials Science*
2004- Member, Program Committee, International Conference on Ferrites, San Francisco.
Member, Program Committee, 41st Annual Magnetism and Magnetic Materials Conference, Jacksonville, Florida.
1999-2004 Member of the Editorial Board, *J. Phys D: Applied Physics*
1994-1999 Deputy Editor - Physical Properties, *Acta/Scripta Materialia*
1995-2001 Member, International Advisory Committee, Osaka University, Center for UHVEM
1991-2001 Member, Steering Committee, National Center for Electron Microscopy, LBNL, Berkeley, CA
1995 Guest Editor - *MRS Bulletin*: Special Issue on "Magnetism on a microscopic scale"

UW Committees (select)

2010 UW Common Book Selection Committee
2005-2006 Member, Search Committee for Chair, Dept. of Computer Science, UW
2004- Member, MSE Department Undergraduate Committee
2004-2005 Member, Search Committee, Director, Center for Nanotechnology, UW
2002-2006 Member, College of Engineering, Council on Promotion and Tenure, University of Washington.
2001-2008 Member, Nanotechnology Ph.D. Program Steering Committee, UW, Seattle

Start-Up Companies

2010 Founder & Managing Member, *LodeSpin Labs, LLC*
Seattle-based start-up company involved in the development of tailored MNPs for a range of biomedical applications.

Awards & Honors

2016	<i>Alexander von Humboldt Forschungspreis (Career Research Award)</i> , Germany “awarded to internationally renowned academics from abroad in recognition of their entire academic record to date”.
2015-16	<i>Brahm Prakash Visiting Professorship</i> , Department of Materials Engineering, Indian Institute of Science, Bangalore, India
2015	Member (elected), Washington State Academy of Sciences for “outstanding record of scientific achievements and willingness to work on behalf of the Academy in bringing the best available science to bear on issues within the state of Washington”
2015	<i>Distinguished Scientist/Engineer Award</i> , Functional Materials Division, The Minerals, Metals & Materials Society (TMS) and cited for seminal contributions to science, technology, and biomedical applications of magnetic materials.
2013	<i>Fellow</i> , Institute of Electrical and Electronics Engineers (IEEE) and cited for contributions of “magnetic nanotechnology in medicine”.
2012	<i>Distinguished Lecturer</i> , Frontiers in Chemistry, Case Western Reserve University
2012	<i>Donald G. Fink Paper Prize</i> , IEEE for best review or overview paper published in 2010 in ALL (~130) journals of the IEEE
2011	Distinguished Scientist Lecture, National Physical Laboratory, New Delhi, India Distinguished Scientist Lecture, National Chemical Laboratory, Pune, India
2010	<i>Fulbright Specialist Award</i> , University of Alexandria, Egypt.
2010	<i>Faculty of the Year</i> , Senior Class of 2010
2010-2015	Member, Fulbright Specialist Roster
2009	<i>Fellow</i> , American Physical Society and cited for “original and creative work in magnetism and electron microscopy elucidating growth mechanisms and the role of microstructure in determining fundamental properties of thin films, nanoscale structures and devices”.
2009	<i>Distinguished Lecturer Award</i> , IEEE Magnetics Society, an award that “celebrates achievements in magnetics and honors the finest researchers and communicators in the field providing them a year-long opportunity to inspire and enthuse, especially young researchers entering a career in magnetics”.
2009	UW Nominee for the AAAS <i>Outstanding Mentor Award</i> .
2008	<i>Rockefeller Foundation Fellowship</i> , Scholarly Residency Program at Bellagio, Italy
2006-2008	<i>The Professor-at-Large</i> , Institute of Advanced Studies, University of Western Australia, “an appointment for scholars of international distinction to roam widely across disciplines and the intellectual life of the campus community”
2005	<i>Fellow</i> , American Association for the Advancement of Science and cited for “establishing fundamental correlations of magnetism, transport and microstructure in technological materials, for developing novel electron microscopy techniques, and for education of the next generation of materials scientists”.
2004	<i>The Outstanding Educator Award</i> , College of Engineering, University of Washington
2004	<i>John Simon Guggenheim Foundation Fellowship</i> awarded to “men and women who have already demonstrated exceptional capacity for productive scholarship or exceptional creative ability in the arts and sciences”
2004	<i>Fellow</i> , Institute of Physics, London
2003	<i>Visiting Senior Fellow</i> , Japan Society for the Promotion of Science
2001-2006	<i>Campbell Chair Professor</i> of Materials Science, University of Washington.
1996	<i>Exceptional Teaching Award</i> , UC Berkeley Materials Research Society
1993	<i>Senior Visiting Scientist Fellowship</i> , Hitachi Central Research Laboratory, Japan
1992	<i>Eli Franklin Burton Medal</i> , Microscopy Society of America, which “honors the distinguished contributions to the field of microscopy and microanalysis of a scientist who is less than 40 years old”
1991	<i>FPSP Visiting Professorship</i> , Dept. of Physics, University of Sao Paulo, Brazil.

Current Research Interests/Projects

Biomedical Nanomagnetism

Comprehensive strategies for imaging, therapeutics and diagnostics using functionalized & tailored magnetic nanoparticles. Current work includes

Therapy: Develop, functionalize and optimize magnetic nanoparticles for targeting, drug/gene delivery, image enhancements and hyperthermia.

Diagnostics: Biosensing using magnetic relaxation in solution and chip-based magnetic separation for immunoassays. Magnetophoretic mobility and manipulation of biological structures using magnetic beads.

Imaging: Superior MRI contrast agents sensitive to biological processes. Development of optimized tracers for quantitative Magnetic Particle Imaging .

Cytotoxicity, Biodistribution and Pharmacokinetics: Cell culture and animal models

Translational Applications: Angiography, molecular imaging for cancer, neuroscience and renal ischemia

Nanocrystals, Nanomagnetism, Nanoscale Transport and Nanomanufacturing

Chemical and physical synthesis of metallic & oxide nanocrystals, including core-shell structures, with narrow size distributions, controlled shapes and tailored surface morphologies. Studies of self-assembly in weakly interacting systems. Ferrofluids and liquid crystals. Fundamental investigations of their static/dynamic magnetic behavior as a function of assembly, dimensionality and inter-particle interactions. Phase stability and coupled properties in core-shell structures.

Thin Films and Lithographically Patterned Heterostructures:

Epitaxial growth by UHV ion-beam sputtering

Nanoimprint lithography: Process development and investigating fundamental properties at characteristic lengths scales.

Proximity, exchange and interface effects with emphasis on exchange bias (AFM/FM) and exchange-spring (FM/FM) behavior.

Defect-mediated ferromagnetism in dilute magnetic semiconducting oxides.

Nanoscale transport and devices in nanoparticle conducting polymer hybrid films.

Semiconductor-magnetic device integration

Advanced characterization with electrons, photons, neutrons and scanning probes

Role of the physical, chemical and magnetic microstructure at relevant length scales in determining the functional behavior of engineered materials. A variety of scattering, imaging and spectroscopy methods are used. These include a) Structural characterization (x-ray reflectivity, small-angle x-ray scattering) and microstructural investigations using advanced transmission electron microscopy; b) Surface characterization by scanning probe microscopy; c) Magnetic characterization and imaging by neutron scattering (IPNS), x-ray magnetic circular dichroism (ALS), photo-emission electron microscopy (ALS), electron holography, Lorentz microscopy and magnetic force microscopy

Photovoltaics & Energy Conversion

Development of low cost photovoltaics by ink-jet printing and earth-abundant materials. Current focus is on chalcogenide phases related to FeS₂.

Mn-based, rare-earth-free permanent magnets for energy conversion (motors, wind generators), synthesized by chemical routes and consolidated with tailored microstructures, including exchange-spring behavior.

Magnetocaloric materials for magnetic refrigeration.

Funded Research Projects at UW

Currently Active

- 2017-2019 Quantitative in vivo analysis of the biodistribution and metabolism of iron oxide nanoparticle formulations tailored for translational medical imaging
PI: Kannan M. Krishnan
NIH 1 R03 EB024819-01 (9/1/17-8/30/19), \$100,000
- 2016-2020 Exchange-coupled metamaterials: fabrication, structure-property relations and applications
PI: Kannan M. Krishnan
NSF/MMN, 9/1/2016 — 8/30/2019, \$450,000
- 2015-2018 Virtual Brain Electrode (VIBE) for imaging neuronal activity
PI: Jeff Bulte (JHU)
NIH 1 R24 MH109085 (10/1/15-7/31/18), \$ 325,511 (UW portion)

Funded Proposals Completed at UW (2001-present)

- 2013-2015 Monodispersed Biocompatible Magnetic Nanoprobes for Improved Diagnostic Imaging
PI: Kannan M. Krishnan
NIH 1R42EB013520-02/NIBIB (8/01/13-7/31/15), \$1,121,168
- 2013-2014 Novel USPIO-MRI contrast agents
PI: Kannan M. Krishnan
UW Center for Commercialization Technology Transfer Grant (1/1/13-9/1/13) \$50,000
- 2012-2016 Low cost, Lightweight, FeS₂-Based Photovoltaic Devices by On-Demand Ink Jet Printing
PI: Kannan M. Krishnan
NASA -NSTRF12-0125 (9/1/12-8/30/16) \$264,000
- 2011-2015 Magnetic Particle Imaging (MPI): A Novel Ultra-sensitive Imaging Scanner for Angiography In Vivo.
PI: Steven Conolly (UC, Berkeley)
NIH 1R01EB013689-01/NIBIB (7/1/11-6/30/15), (UW Subcontract: \$792,204)
- 2011-2014 Magnetic behavior of nanoengineered lithographic particles and arrays in the single domain limit
PI: Kannan M. Krishnan
NSF-1063489/DMR/MMN (7/1/11 – 6/30/14), \$525,000
- 2011-2013 Monodispersed Biocompatible Magnetic Nanoprobes for Improved Diagnostic Imaging
PI: Kannan M. Krishnan
NIH 1R41EB013520-01/NIBIB (8/15/11-7/31/13), \$232,718
- 2011-2012 Optimized tracers for MPI: pilot animal studies and performance validation
PI: Kannan M. Krishnan
UW Center for Commercialization/TGIF-655908 (7/1/11-6/30/12) \$50,000
- 2008-2011 Engineering and performance of magnetic particle imaging in biomedicine
PI: Kevin Minard (PNNL)
Co-Investigator: Kannan M. Krishnan
NIH/ISD R21
- 2006-2011 Synthesis and optimization of nanoparticle contrast agents for MRI
PI: Kannan M. Krishnan
NIH /NINDS, (1/1/07-6/30/11)
- 2006-2011 Exchange anisotropy, engineered coercivity and spintronics in atomically engineered L1₀ heterostructures.
PI: Kannan Krishnan
Department of Energy, Office of Basic Energy Sciences

2008-2009 Acquisition of a SAXS facility for Research and Education in Nano-structured materials
 PI: Danilo Pozzo
 Co-PI: Kannan M. Krishnan.
 NSF/IMR

2005-2009 Metallic Core-shell Nanostructures: synthesis, stability, coupled properties and novel devices
 PI: Kannan M. Krishnan
 NSF/DMR, Metals #0501421

2005-2008 Dilute Magnetic Dielectrics: New Spintronics Materials and Devices
 PI: Kannan Krishnan Kannan Krishnan
 NSF/ECS #0501490

2005-2008 An integrated laboratory for physical property measurements of advanced materials and novel devices.
 PI: Kannan Krishnan
 Co-PIs: F. Ohuchi (Physics), B. Parviz (EE) and D. Gamelin (Chemistry)
 Murdock Foundation

2006-2007 Magnetic thin film structures
 PI: Kannan Krishnan
 Yadav Technology

2002-2006 Varied synthetic approaches to the development of room-temperature ferromagnetic and semiconducting oxide nanostructures for silicon-based spintronics.
 NSF/ECS #0224138
 PI: Kannan Krishnan,
 Co-PIs: M. Olmstead (Physics), D. Gamelin (Chemistry) and S. Chambers (PNNL)

2002-2006 Isolated and collective magnetic phenomena in metallic nanocrystals and their superlattices.
 NSF/DMR #0203069
 PI: Kannan Krishnan
 International Supplement to "Isolated and collective magnetic phenomena in metallic nanocrystals and their superlattices"
 PI: Kannan M. Krishnan, NSF/DMR

2003-2006 Acquisition of a Scanning Probe Microscope system for research and education in nanomagnetism and spinelectronics.
 PI: Kannan M. Krishnan, NSF/DMR
 Co-PIs: M. Olmstead (Physics) and D. Gamelin (Chemistry)

2002-2006 Atomically Engineered Mn-Pd-Fe Heterostructures: Exchange Anisotropy and Advanced Characterization with Electron, Photon and Neutron Probes.
 DoE/BES #DE-FG03-02ER45987
 PI: Kannan Krishnan,

2002-2003 Acquisition of state-of-the-art scanning electron microscopes for materials research at the University of Washington, Seattle
 PI: Mehmet Sarikaya,
 Co-PIs: Y. Xia, D. Cobden, D. Schwartz and Kannan M. Krishnan
 Murdoch Foundation: 12/02-12/03

2004 Materials for magnetic actuation in MEMS devices
 PI: Kannan Krishnan
 Washington Technology Center and Microvison Inc.

2004-2005 REU Supplement: Varied synthetic approaches to the development of room-temperature ferromagnetic and semiconducting oxide nanostructures for silicon-based spintronics.
 PI: Kannan M. Krishnan
 NSF/ECS

2002-2003 Dilute magnetic semi-conducting oxide thin films and nanostructures

PI: Kannan KrishnanJIN/PNNL

Patents & Disclosures

- 2016 Sonu Gandhi, Hamed Arami and Kannan M. Krishnan, “Protease cleaved Nanoparticle Aggregates” , UW Disclosure 47478, September 25, 2015.
- 2017 Amit Khandhar, Kannan M. Krishnan, R.M. Ferguson and S. J. Kemp, “Coated magnetic nanoparticles” . (U.S. Patent #9555136, January 31, 2017)
- 2104 Zheng Li and Kannan M. Krishnan, “Misalignment-free logic operation in a 3-input MQCA full adder using a 45° clocking mechanism”, UW Disclosure #2806, 6/10/2014
- 2013 Zheng Li and Kannan M. Krishnan, “Misalignment-free signal propagation in nanomagnet arrays and logic gates with 45° clocking field”, UW Disclosure #2476, 10/03/2013
- 2013 Hamed Arami and Kannan M. Krishnan, “Functionalized magnetic particle imaging (MPI) tracers as multimodal contrast agents”, UW Disclosure #2404, 8/15/2013
- 2012 Hamed Arami and Kannan M. Krishnan, “Monodispersed functionalized iron oxide nanoparticles as ultrasmall MRI T1 contrast agents with long-term stability in biological media”, UW Disclosure #2046, 10/30/2012
- 2012 Hamed Arami and Kannan M. Krishnan, “A library of functionalized iron oxide nanoparticles for biomedical applications”, UW Disclosure #2045, 10/30/2012
- 2012 Yi-Cheng Lee, Kannan M. Krishnan and Alan Koretsky, “Engineering Delayed MRI Contrast Using Silica Coated MnO Nanoparticles as Responsive MRI Agents for In vivo Sensing of Biological Uptake”, UW Disclosure #1658, January 26, 2012.
- 2011 Kannan M. Krishnan and Wei Zhang, “Synthesis and direct release of magnetic nanoparticles by defect free thermal printing”, UW Disclosure #1555, Nov 11, 2011)
- 2011 Kannan M. Krishnan, R. M. Ferguson and A.P. Khandhar, “Tuned multifunctional magnetic nanoparticles for biomedicine”, (US Patent #9,259,492; Feb 16, 2016)
- 2000 Modification of the magnetic properties of commercial thin film recording media by ion beam irradiation – a novel approach to achieve high density patterned media; Krishnan and Wright, (UC Disclosure, July 20, 2000)
- 1996 Polymeric organometallic synthesized magnetic perovskite structures, with A.R. Modak, (elected by UC, May 1996)
- 1994 Kannan M. Krishnan, “Ferromagnetic Thin Films”, (US Patent #5,374,472; Dec 20,1994)

Teaching at UW

Current Portfolio of Courses

- *The Nanoworld (Gen Stud. 197D, Freshman seminar, Winter)* , 1 credit

Introduction and appreciation of the science and technology of the small, the very small and the very, very small – one of the rapidly developing areas of interdisciplinary science and technology.

- *Science and technology of nanostructures (MSE 481, Winter- alternate years)*, 3 credits
Developed and introduced this new interdisciplinary course. Prepared five extensive reading modules and taught it in a “cooperative learning” format emphasizing student-centered learning. Worked with the Engineering and iSchool Writing Center to help the students with their writing assignments (the course now meets the A&S writing requirements). I received the Faculty of the Year award from the Senior Class of 2010 for this course.
- *Bonding, crystallography and symmetry-related properties (MSE 510, Fall)*, 3 credits
This is the first required foundation course for all MSE graduate students at UW. Also taken by students in Chem. Eng., Bioeng., Physics etc. Developed the course from scratch to serve as a foundation for the graduate program in MSE.
- *Magnetism, magnetic materials and related technologies (MSE 450/550, Winter- alternate years)*, 3 credits
A comprehensive introduction to magnetism, magnetic materials and related applications. A description of magnetic phenomena on a macroscopic scale will be followed by discussions of modern experimental methods for magnetic measurements. Intrinsic and phenomenological concepts of magnetism such as electronic magnetic moments and classical, quantum and band theories of magnetic behavior will also be introduced. The course will then cover ordered magnetic materials (emphasizing their structure-sensitive properties) and magnetic phenomena, including magnetic anisotropy, magnetic domain structures & dynamics and magnetostriction. Finally, the magnetic behavior of small particles & thin films and a range of applications, including magnetic recording, permanent magnets, biomagnetics, and spin electronics is presented.
- *Advanced magnetism and magnetic materials (MSE 599N, Offered as necessary)*, 3 credits
Seminar format addressing recent developments and trends in magnetism, magnetic materials, biomedical nanomagnetics and spin electronics, based on readings, discussions and presentations of scientific papers and reviews.
- *Principles of Materials Characterization and Analysis (MSE 333, Spring)*, 3 credits
The course covers the basics of materials characterization using electrons, photons, neutrons, ions and scanning probes. It includes a comprehensive but beginner’s discussion of scattering/diffraction, imaging and spectroscopy methods, including their range of applicability and limitations. The ultimate goal is to enable students to select the appropriate technique and apply it critically to solve specific materials characterization problems in the wide range of materials, morphologies and dimensionalities encountered today.
- *Seminar in materials science and engineering (MSE 520A, All Quarters)*, 1 credit
Completely changed the organization of this seminar to involve significant graduate student participation in its conception and organization. Involved substantial training and supervision of graduate students in the first two quarters. This seminar has made a major impact on the confidence, team work, collegiality and content of the graduate program in the department.

Teaching Evaluations

At UW, all courses are ranked by students on a scale of 1-5,
5 = excellent, 4= v.good, 3=good, 2=fair, 1=poor)

Qtr.	Course/Title	Credits	Hours/wk	Students	Instructor's Contribution	Overall Course
Sp02	MSE 550	3	3	18	4.6	4.9
	MSE 520A	1	1	37	N/A	N/A
Au02	MSE 510	3	3	15	5.0	4.8
	MSE 520A	1	1	37	N/A	N/A
W03	MSE 481	3	3	16	3.8	3.9

	MSE 520A	1	1	37	N/A	N/A
Sp03	MSE 550	3	3	13	4.8	4.8
	MSE 520A	1	1	28	N/A	N/A
Au03	MSE 510	3	3	23	4.3	4.1
	MSE 520A	1	1	37	N/A	N/A
W04	MSE 481	3	3	6	4.8	4.6
	MSE 520A	1	1	41	N/A	N/A
Sp04	MSE 599	3	3	8	--	--
	MSE 520A	1	1	28	N/A	N/A
Au04	MSE 510	3	3	14	4.3	3.8
	MSE 520A	1	1	37	N/A	N/A
Au05	MSE 510	3	3	20	4.7	4.1
	MSE 520A	1	1	37	N/A	N/A
W06	MSE 481	3	3	27	4.2	3.9
	MSE 520A	1	1	37	N/A	N/A
Au06	MSE 510	3	3	21	4.7	4.6
W07	MSE 481	3	3	27	3.6	3.9
Sp07	MSE550	3	3	13	4.9	4.9
A07	MSE510	3	3	19	5.0	4.4
W08	MSE481	3	3	27	3.6	3.3
Sp08	MSE550	3	3	10	4.9	4.8
F09	MSE510	3	3	14	4.6	4.7
W10	MSE481	3	3	18	4.8	4.6
Sp10	MSE550	3	3	7	4.9	4.6
F10	MSE510	3	3	14	4.6	3.8
W11	MSE481	3	3	20	4.9	4.9
Sp 11	MSE550	3	3	9	4.3	4.0
F 11	MSE510	3	3	12	5.0	4.2
W12	MSE481	3	3	20	4.2	4.3
Sp12	MSE550/450	3	3	12	4.6	4.1
F12	MSE510	3	3	15	4.3	3.8
W13	MSE481	3	3	23	4.6	4.0
F 13	MSE510	3	3	23	4.3	4.0
Sp 14	MSE333	3	3	57	4.8	4.5
Au 14	MSE510	3	3	22	3.9	
W 15	MSE450/550	3	3	17	4.7	4.4
Average					4.5	4.3

Dissertation Committees (completed)

As Chair

- 2017 **Olivia Lenz** (Ph.D. in MSE & Nanotechnology)
Chalcogenide nanomaterials for energy applications
- 2017 **Byung Seok-Kwan** (Ph.D. in MSE & Nanotechnology)
Multilayered Magnetic Nanoparticles via Nanoimprint Lithography for Biomedical Applications
- 2017 Alyssa Troksa (M.S. in Materials Science and Engineering)

- 2015 Iron oxide nanoparticle coatings for enhanced MPI visualization of vascular catheters.
Zheng Li (Ph.D. in MSE & Nanotechnology)
Magnetism and interactions within the single domain limit: reversal, logic and information storage
- 2015 **Hamed Arami** (Ph.D. in MSE & Nanotechnology)
Magnetic particle imaging (MPI) tracers for *in vivo* applications
- 2014 **Hou Yufeng** (Ph. D. in MSE)
Magnetic thin film Fe ring structures and devices
- 2013 **Amit P. Khandhar** (Ph.D. in MSE)
Biomedical imaging and therapy with physically and physiologically tailored magnetic nanoparticles
- 2013 **Wei Zhang** (Ph.D. in MSE & Nanotechnology)
Competing anisotropies in epitaxial exchange-biased thin films and patterned nanostructures
- 2011 **R.M. Ferguson** (Ph.D. in MSE & Nanotechnology)
Tracer design for magnetic particle imaging: modeling, synthesis and experimental optimization of biocompatible iron oxide nanoparticles.
- 2011 **Yi-cheng Lee** (Ph. D. in Materials Science & Engineering, UW)
Synthesis, characterizations and application MnO nanocrystals as pH-responsive, time-dependent T_1 MRI contrast agents
- 2010 **Tianlong Wen** (Ph.D. in MSE & Nanotechnology)
"Cobalt based magnetic nanocomposites: fabrication, fundamentals and application"
- 2009 **Bradley K. Roberts** (Ph.D. in Materials Science & Engineering, UW)
"Defect-mediated magnetism of transition metal doped ZnO thin films".
- 2007 **Ms. Marcela Gonzales** (Ph.D in Materials Science and Engineering, UW) " Magnetic Fluid Hyperthermia: Synthesis, Modeling and Quantification",
- 2007 **Yonsoo Chun** (Ph.D . in Materials Science and Engineering, UW) "Domain wall stability and resistance in perpendicularly-coupled metal/oxide bilayers"
- 2007 **Xiaosong Ji** (Dual Ph.D. in Materials Science and Engineering and Nanotechnology, UW) "Perpendicular anisotropy and exchange bias in magnetic thin film heterostructures"
- 2007 **Ms. Kelli Griffin** (Ph.D in Materials Science & Engineering. UW) "Cobalt doped TiO_2 anatase thin films: ferromagnetism, spin-electronics and the environment".
- 2006 **Ms. Yuping Bao** (Dual Ph. D., in Materials Science & Engineering and Nanotechnology, UW), "Synthesis, Self-assembly and Potential Applications of Cobalt-based Nanoparticles with Tailored Magnetic Properties".
- 2005 **Zachary Lingley** (M.S. in Materials Science & Engineering, UW) "Spin-resolved quantum conductance".
- 2005 **John Kamencik** (M.S. in Materials Science & Engineering, UW), "Zinc oxide based transparent thin film transistor: a materials and device study"
- 1997 **Ms. Marilee Brewer** (Ph. D. in Materials Science & Engineering, UCSB), " Giant moment in $Fe_{16}N_2$ epitaxial thin films".

As member

- 2011 **Shivang Dave** (Ph.D. in Bioengineering, UW)
- 2011 **Adam Rauerdink** (Ph.D. in Engineering, Dartmouth)

Continuing graduate student committees at UW

- Carolyn Shasha** (Ph. D. in Physics) (Role: Chair)
Started 9/15/15
- Ryan Hufschmid** (Ph.D. in MSE) (role: Chair)
Started 6/15/12

Eric Teeman (Ph.D. in MSE) (role: Chair)
Started 8/01/13

Research group at UW (current)

Post-Doctoral Fellow

Doctoral Students

- Ms. Carolyn Shasha (9/15-)
- Ms. Olivia Lenz (9/11 -)
- Mr. Ryan Hufschmid (9/12-)
- Mr. Byung-Seok Kwon (9/12-)
- Mr. Eric Teeman (8/13 --)

Masters Students

- Ms. Alyssa Troksa (9/15 -)

Undergraduate Students (current)

Alumni at UW

Post-doctoral Fellows

- Dr. Asahi Tomitaka
Presently at Florida University
- Dr. A. Pakhomov, Joffe Institute, Russia,
Visiting scientist (6/02-5/05), Assistant Research Professor (5/05-present)
- Dr. Q.F. Zhan, post-doctoral Fellow (September 2008- September 2010)
Presently, Researcher, Ningbo Institute of Technology, China
- Dr. Peter Blomqvist, Post-doctoral Fellow (2002-2004),
Presently working in a start-up company in Copenhagen, Denmark.
- Dr. Saikat Mandal, Post-doctoral Fellow (2005-6)
Presently a Humboldt Post-doctoral Fellow, Germany.
- Dr. S.H. Lim. Kangwon University, Korea (March, 2008- Feb, 2009)

Doctoral Students

- Mr. Zheng Li (12/15, Ph.D. in MSE)
Senior Engineer, Apple Inc. , CA
- Mr. Hamed Arami (12/15, Ph.D. in MSE)
Post-doctoral Fellow, Radiology, Stanford University
- Mr. Amit P. Khandhar (12/13, Ph.D. in MSE)
Research Scientist & Partner, LodeSpin Labs, Seattle
- Mr. Wei Zhang (6/13, Ph.D. in MSE)
Assistant Professor of Physics, Oakland University, MI
- Mr. R. M. Ferguson (12/11, Ph.D. in MSE)
Intellectual Ventures, Seattle, WA
- Mr. Yi-cheng Lee (6/11, Ph. D. in MSE)
Presently, Staff Scientist, ITRI, Taiwan
- Mr. Tianlong Wen (12/10, Ph.D. in MSE)
Post-doctoral Fellow, Dept. Physics, Carnegie Mellon University.
- Mr. B. Roberts (1/03, Ph.D. in MSE, 6/09)
Presently, Technical Assistant, Intellectual Ventures, Seattle, WA
- Ms. M. Gonzales (1/03, Ph.D. in MSE, 10/07)

- Presently, Staff Research Associate II, Children's Hospital Oakland Research Institute, Oakland, CA
- Mr. Yoonsoo Chun (1/03, Ph.D. in MSE, 10/07)
Presently, Researcher, Korea Institute of Science and Technology, Seoul, Korea
 - Mr. Xiaosong Ji (9/03, Ph.D. in MSE & Nanotechnology 9/07),
Presently, Senior Engineer, Applied Materials.
 - Ms. K. Griffin (9/03, Ph.D. in MSE, 2/07),
Presently a postdoctoral fellow at Cornell University
 - Ms. Yuping Bao (6/01, Dual Ph. D. in MSE & nanotechnology, Completed 3/06)
Presently, Reichhold-Shumaker Assistant Professor of Chemical and Biological Engineering, Adjunct Faculty of Biological Science, University of Alabama.

Masters Students

- Mr. Z. Lingley (M.S., March 2005) – “Spin-resolved quantum conductance”,
Presently a doctoral graduate student at USC.
- Mr. J. Kamencik (MS, June 2005) – “Zinc oxide based transparent thin film transistor: a materials and device study”,
Presently at Intel. Oregon

Undergraduate Seniors

- Ms. Twyla Sampaco (BS, MSE, 2011)
- Ms. Larissa Miller (BS, MSE, 2011)
- Mr. C. Petz (BS, MSE, 2007)
SURP Fellow (2005)
- Ms. P. Voll (B.S. Physics, 2007)
Mary Gates Fellow (2006); Presently a graduate student at Stanford
- Mr. J. Silvia (B.S. Chemistry, 2005)
Mary Gates Fellow, Goldwater Fellowship,; Presently a graduate student at MIT

Principal scientific collaborators (current, select)

- Dr. Gerhard Adam, University Klinikum Hamburg-Eppendorf (Radiology)
- Dr. Tobias Knopp, University of Hamburg (Magnetic Particle Imaging).
- Dr. Johannes Salamon, UKE-Hamburg (Radiology)
- Dr. Michael Farle, U. Duisburg-Essen, (Ferrmagnetic Resonance)
- Dr. Heiko Wende, U. Duisburg-Essen (Mössbauer Spectroscopy)
- Dr. Steve Conolly, UCB, Magnetic Particle Imaging.
- Dr. Denny Liggitt, Chair, Department of Comparative Medicine (animal experiments)
- Dr. Julian Simon, Fred Hutchison Cancer Research Center, (nanoparticle functionalization for cancer targeting)
- Dr. A. Koretsky, National Institute of Health (MRI contrast enhancement)
- Dr. Scott Chambers, PNNL (Spintronics)
- Profs. W. Grogger and F. Hofer, Univ. of Graz, Austria (Electron Energy-filtered Imaging)
- Prof. Robert Stamps, Glasgow University (Lorentz microscopy)
- Dr. Sam Bader, Materials Science Division, Argonne National Laboratory (Hard Magnets)
- Prof. Y. Murakami, Kyushu University, Japan (Electron Holography)
- Dr. P. Stayton, Department of Bioengineering, UW (Surface functionalization of magnetic nanoparticles)

Outreach Activities (select)

- Participant in the annual UW Fall freshman orientation (2003, 2004, 2005)

- Established a complete exhibit entitled “Magnetoland” with the help of my graduate students for the College of Engineering Open House (2004, 2005, 2006)
- Lunch-time lecture and discussion with students on “Nanoscience and Nanotechnology”, Highline Community College, Seattle.
- Lunchtime lecture/discussion with UW Honors students on “Striving for Balance”.
- Public lecture on ‘Spins, Bytes and Cures”, Perth, Australia (2006).

Invited Lectures (2009 - present)

2017

- 07/20/17 “Tracer development for MPI: recent status and current status in translational applications”, University of Aachen, Germany
- 04/18/17 “Magnetic Particle Imaging: Fundamentals and Applications in Cancer, Cardiovascular and Stroke Imaging” Department of Interventional Neuroradiology, Stanford Health Care, PaloAlto, CA

2016

- 12/06/16 “Magnetic Particle Imaging: Fundamentals and Applications in Cancer, Cardiovascular and Stroke Imaging” Department of Radiology, UW
- 08/22/16 “Translating Magnetic Particle Imaging to the Clinic: the Tracer Perspective”, Radiology Colloquium, University Klinikum Eppendorf, Hamburg, Germany
- 08/17/16 “Magnetic Particle Imaging: Translating science and technology to medicine”, Department of Physics, U. Würzburg, Germany
- 08/15/16 “Magnetic Particle Imaging: Translating science and technology to medicine”, Department of Physics, U. Würzburg, Germany
- 07/18/16 “Nanomagnetism: from materials to medicine and information”, University of Kyushu, Japan
- 07/13/16 “Magnetism in medicine and biology”, Two lectures given at the IEEE Magnetics Society International Summer School, Tohoku University, Sendai, Japan
- 06/27/16 *Magnetic Particle Imaging: Translating science and engineering to medicine*”, Department of Physics, University of Duisburg-Essen, Germany
- 06/20/16 “Magnetism, nanoscience and nanotechnology”, Department of Physics, University of Duisburg-Essen, Germany
- 01/11/16 “Nanomagnetism: From materials to medicine and information”, Jawaharlal Nehru Center for Advanced Scientific Research, Bangalore, India.
- 01/12/16 “From materials to medicine: a spin through recent developments in imaging, diagnostics and therapy”, Brahm Prakash Distinguished Visitor Lectures, Department of Materials Engineering, Indian Institute of Science, Bangalore, India
- 01/14/16 “Magnetism on the mesoscale; Nanotechnology, Lithography, Information Storage & Logic”, Brahm Prakash Distinguished Visitor Lectures, Department of Materials Engineering, Indian Institute of Science, Bangalore, India.
- 01/18/16 “Magnetism, microstructure and materials characterization”, Brahm Prakash Distinguished Visitor Lectures, Department of Materials Engineering, Indian Institute of Science, Bangalore, India.
- 01/21/16 “Magnetism, Nanoscience and Nanotechnology”, Brahm Prakash Distinguished Visitor Lectures, Center for Nanoscience & Engineering, Indian Institute of Science, Bangalore, India

2015

- 12/15/15 “Magnetic particle Imaging: Recent developments and translational applications in cardiovascular disease and molecular imaging of cancer”, Invited Talk, PACIFICHEM, Hawaii
- 11/15 “Clinical translation of Magnetic Particle Imaging: The tracer perspective” Invited Talk, MRS Fall Meeting, Symposium N, Boston
- 11/15 “Surface Functionalized Magnetite Nanoparticles: Novel Diagnostic Assays and Imaging Using Magnetic Relaxation Dynamics”, Invited Talk, MRS Fall Meeting, Symposium M, Boston
- 10/14/15 “Tunable mesoscale magnetic structures by nanoimprint lithography”, Scottish Universities Physics Association Lecture
- 10/13 “Biomedical Nanomagnetism: progress and opportunities at the intersection of physics, magnetism and biomedicine”, University of Glasgow, UK
- 09/29/15 “Recent progress and opportunities at the intersection of physics, magnetism and biomedicine”, Plenary “Talk, Annual Meeting of The Colombian Physical Society, Manizac, Colombia.
- 07/14/15 “Clinical translation of magnetic particle imaging – the tracer perspective”, Colloquium, Department of Experimental Oncology and Nanomedicine, University of Erlangen, Germany
- 07/08/15 “Tracers for Magnetic Particle Imaging: from science and engineering to clinical translation”, Invited Plenary Talk, International Conference on Magnetism, Barcelona, Spain
- 06/23/15 “Clinical translation of magnetic particle imaging – the tracer perspective”, Invited Talk, Frontiers in Biomagnetic Nanoparticles Workshop, Telluride Colorado.
- 05/27/15 “Tunable nanoscale magnetic structures by nanoimprint lithography”, Invited keynote talk, EIBN Conference, San Diego, CA
- 2/24/15 “Magnetic particle imaging for cardiovascular disease and molecular imaging”, Invited Keynote Talk, Multifunctional Nanoparticles in Medicine Workshop, Madrid, Spain

2014

- 9/9/14 “Magnetic Particle Imaging: The tracer perspective”, Department of Biomedical Technology, RWTH, Aachen, Germany
- 9/2/14 “Controlled relaxation dynamics in vivo of functionalized nanoparticle tracers in magnetic particle imaging”, Physikalisch Technik Bundeslat, Berlin, Germany
- 8/29/14 “Recent advances in tracer development for Magnetic Particle imaging”, University Klinikum Eppendorf, Hamburg, Germany
- 03/27/14 “Optimized tracers for Magnetic Particle Imaging: Progress and Challenges”, Invited Keynote Lecture, 4th International Workshop on Magnetic Particle Imaging, Berlin, Germany

2013

- 08/28/13 “Magnetic Particle Imaging for cardiovascular angiography and molecular imaging” Invited Plenary talk, Joint European Magnetic Society Meeting, Rhodos, Greece
- 06/06/13 “Biomedical nanomagnetism: translating science and technology to clinical applications”, College of Engineering Colloquium, UC Davis
- 06/05/13 “Magnetic Nanostructure”, Physics Department Colloquium, UC Davis
- 04/16/13 “Advances in medical imaging with tailored magnetic oxide nanoparticles”, Invited Keynote Talk, International Conference on Ferrites, Okinawa, Japan.
- 04/09/13 “Biomedical nanomagnetism: advances in in vivo imaging and therapy”, Invited Keynote Talk, Latin American Workshop on magnetism, Buenos Aires, Argentina
- 03/22/13 “Enabling pre-clinical translation of MPI by developing optimal, biocompatible tracers”, National Center for Cardiovascular Research (CNIC), Madrid, Spain.
- 03/19/13 “Biomedical nanomagnetism: translating science and technology to clinical applications”, University of Budapest, Hungary
- 03/14/13 “Exchange, anisotropy and relaxation in magnetic thin film heterostructures and nanoparticles”, Condensed Matter Physics Colloquium, University of California, Davis

2012

- 12/03/12 “Nanomagnetism in biomedicine and information storage and logic”, MSE Department Colloquium, University of Washington, Seattle.
- 11/01/12 “Nanomagnetism: Directions and opportunities in Science and Technology”, Energizer Battery Co. Ltd. , Cleveland OH
- 11/01/12 “Biomedical nanomagnetism: advances in in vivo imaging and therapy”, Frontiers in Chemistry Lecture, Case Western Reserve University, Cleveland, OH
- 10/02/12 “Magnetic Particle Imaging: the tracer perspective”, Dept. of Radiology, UW, Seattle
- 08/08/12 “Magnetism and microstructure: challenges and opportunities for electron microscopy”, Pacific Northwest National Laboratory, Richland, WA
- 05/31/12 “Nanomagnetism in biomedicine: recent developments in imaging and therapy”, Bioengineering Department Colloquium, University of Washington, Seattle
- 05/25/12 “Optimized tracers for magnetic particle imaging”, Invited Keynote Talk, 11th International Conference on Scientific and Clinical Applications of Magnetic Carriers’, Minnesota, USA
- 04/26/12 “Biomedical Nanomagnetism: Translating Science & Technology to Clinical Applications”, Chemistry Department Colloquium, Clemson University, South Carolina
- 04/20/12 “Nanomagnetism: Probing structure-property correlations and growth dynamics in nanoparticles and core-shell structures”, Pacific Northwest National Laboratory, Washington
- 03/15/12 “Optimizing tracers for magnetic particle imaging”, Keynote lecture, 2nd International Workshop on Magnetic Particle Imaging, IWMP12012, Lübeck, Germany
- 02/09/12 “Biomedical Nanomagnetism: Advances in imaging, diagnostics and therapy”. Invited lecture, Magnetic Single Nano-Object Workshop & School, Ecole de Physique, Les Houches, France

2011

- 12/26/11 “Biomedical Nanomagnetism: Translating Science & Technology to Clinical Applications”. Indian Institute of Science, Bangalore, India
- 12/23/11 Distinguished Scientist Lecture, National Chemical Laboratory, Pune, India. “Biomedical Nanomagnetism: Translating Science & Technology to Clinical Applications”.
- 12/19/11 Distinguished Scientist Lecture, National Physical Laboratory, New Delhi, India, “Nanomagnetism: Directions and Opportunities in Science & Technology”.
- 9/23/11 Department of Physics, University of Stellenbosch, Cape Town, South Africa
- 9/21/11 Department of Biology, Council of Scientific and Industrial Research, Pretoria, South Africa
- 9/20/11 Department of Chemistry, University of Witwatersrand, Johannesburg, South Africa
- 9/6/11 Departments of Chemistry and Physics, University of the Free State, Bloemfontein, South Africa
- 6/14/11 Summer School "Nanoscience in Paris-Ile deFrance". Two lectures on “Size effects in magnetism and biomedicine”, and “Biomedical Nanomagnetism: imaging, diagnostics and therapy”
- 3/21/11 Indian Institute of Science, Solid State and Structural Chemistry Unit, “Nanoscale magnetic relaxation dynamics optimized for biomedicine”, Bangalore, India
- 2/22/11 International Workshop on Advanced Materials, Center for Advanced materials, “Biomedical Nanomagnetism with optimal magnetic nanopropbes”, Ras-al-Khaima, UAE.
- 2/13/11 SPIE Medical Physics Invited Panel Presentation, “Optimal magnetic nanoparticles for Magnetic Particle Imaging”, Florida, USA

2010

- 12/16/10 International Nano Workshop, Invited Keynote Talk, “Biomedical nanomagnetism”, Mangalore, India

- 10/21/10 International Latin American Workshop on Nanoscience, Inaugural Keynote Talk, "Introduction to nanoscience and advances in biomedical nanomagnetism". Barranquilla, Colombia.
- 10/18/10 American Vacuum Society Annual Meeting, Invited Keynote Talk, "Nanostructured magnetic thin film heterostructures: Fabrication, Exchange Interactions and Tailored Anisotropies", Albuquerque, New Mexico
- 9/30/10 American University Cairo, Egypt. "Biomedical nanomagnetism: Science, Technology and Translational Research".
- 9/27/10 Department of Physics, University of Alexandria, "Biomedical nanomagnetism".
- 9/22/10 National Research Center, Cairo, Egypt. "Introduction to nanoscience and advances in biomedical nanomagnetism".
- 9/21/10 Department of Biophysics, Institute of Medicine, University of Alexandria, "New possibilities in imaging, diagnostics and therapy with functionalized magnetic nanoparticles".
- 9/18/10 University of Alexandria, Department of Physics, "Directions and opportunities in Nanomagnetism".
- 6/18/10 GreenNano Workshop Portland, Invited talk "Nanomagnetism and biomedicine: challenges and opportunities"
- 5/26-28/10 Scientific and Clinical Applications of Magnetic Carriers, Rostock, Germany, Three invited tutorials on "Introduction to the physics of magnetic nanoparticles".
- 5/14/10 Royal Technical University, Stockholm. Symposium on Frontiers in Nanoscience and Nanotechnology. Two invited talks on "Biomedical Nanomagnetism" and "Physics and Applications of Nanomagnetism".
- 4/30/10 Institute for Theoretical Sciences Colloquium, University of Notre Dame,
- 4/16/10 "Nanomagnetic structures: fabrication, magnetic correlations and biomedical applications", Physics Colloquium, Simon Fraser University, Vancouver, Canada
- 4/8/10 "Theranostic multifunctional magnetic nanoparticles for biomedicine", Invited Talk, MRS Spring Meeting, San Francisco.
- 3/24/10 "Biomedical nanomagnetism" Keynote Talk, Special Symposium on "Magnetism and Medicine", Annual Meeting German Physical Society, Regensburg, Germany
- 3/19/10 "Size optimized magnetite nanoparticles for magnetic particle imaging", International Workshop on Magnetic Particle Imaging, Luebeck, Germany.
- 3/16/10 "Biomedical nanomagnetism: a spin through new possibilities in diagnostics, imaging and therapy", Danish Technical University, Copenhagen, Denmark
- 2/19/10 "Directions and opportunities in nanomagnetism", Keynote Talk, International Conference on Nanoscience and Nanotechnology, Mumbai, India
- 2/17/10 "Biomedical nanomagnetism: a spin through new possibilities in diagnostics, imaging and therapy", Cancer Nanotechnology Workshop, IITB, Mumbai, India

2009

IEEE Magnetics Society Distinguished Lecture, "Biomedical Nanomagnetism: a spin through new possibilities".

- National Center for Materials Science, JNCASR, Bangalore, India, Dec 21, 2009
- National Center for Biological Sciences, Bangalore, India, Dec 18, 2009
- NIMS, Tsukuba, Japan, Dec 15, 2009
- Advanced Institute of Science and Technology, Tsukuba, Japan, Dec 14, 2009
- Oregon State University, Dept. of Electrical Engineering, Corvallis, Dec 3, 2009
- IEEE Magnetics Society, Northern California Chapter, Berkeley, Nov 20, 2009
- IEEE Magnetics Society Santa Clara Chapter, San Jose, Nov 19, 2009
- Argonne National Laboratory, Chicago, Nov 12, 2009
- University of Alabama, Tuscaloosa, Nov 6, 2009

- University of Colorado, Colorado Springs, Department of Physics, October 30, 2009
- University of Colorado Boulder, IEEE Rocky Mountain Chapter, October 29, 2009
- Advanced Light Source, Berkeley, Nanomagnetism Workshop, October 24, 2009
- North Eastern University, Boston IEEE Chapter, October 23, 2009
- Seagate Technology, Minnesota, October 16, 2009
- IEEE Chapter, Minneapolis, University of Minnesota, October 15, 2009
- Plenary Lecture, Colombian Physical Society, Santa Marta, Colombia, October 6, 2009
- School of Pharmacy, University of British Columbia, September 17, 2009
- Department of Physics, Iasi University, Romania, July 20, 2009.
- Department of Physics, University of Florence, Italy, July 8, 2009.
- Department of Fisica Fonamental, University of Barcelona, Spain, July 2, 2009
- National Institute of Materials Science, CSIC, Madrid, Spain, July 1, 2009
- INESC and Dept. of Physics, Instituto Tecnico, Lisbon, Portugal, June 30, 2009
- Department of Electrical Engineering, Univ. Paris-Sud, France, June 28, 2009
- Department of Physics, Univeristy of Lyon, France, June 25, 2009
- SPINTEC, CNRS, Grenoble, France, June 24, 2009
- **LABORATOIRE DE PHYSIQUE DES MATERIAUX**, University of Nancy, France, June 23, 2009
- Institute of Molecules and Materials, Radboud University, Nijmegen, Holland, June 22, 2009
- Department of Physics, University of Duisburg-Essen, June 21, 2009
- Department of Physics, Glasgow University, UK, June 19, 2009
- Department of Physics, University of York, UK , June 18, 2009
- Institute for Science and Technology in Medicine, Keele University, UK, June 17, 2009
- The Royal Institution, London, June 16, 2009
- Department of Physics, University of Southampton, UK, June 15, 2009
- Center for Magnetic Recording Research, UC San Diego, June 1, 2009
- Institute Colloquium, Tata Institute of Fundamental Research, Mumbai, India, May 14, 2009
- Department of Materials Science, Hokkaido University, Japan, May 7, 2009
- IEEE Magnetics Society, Tokyo Chapter, Tokyo Institute of Technology, Japan, April 23, 2009.
- Korea Advanced Institute of Science and Technology, Daejong, Korea, April 17, 2009
- Korea Univesrity & KIST, Seoul, Korea, April 16, 2009
- IEEE Magnetics Society, Sendai Chapter, Tohoku University, Japan, April 13, 2009
- Dept. of Physics, Fudan University, Shanghai, China, April 3, 2009
- Dept. of Physics and State Key Laboratory of Microstructures, Nanjing University, Nanjing, China, March 31, 2009
- Dept. of Physics, Peking University, Beijing China, March 30, 2009
- Institute of Physics, Beijing, March 30, 2009
- Tsing Hua University and Industrial Technology Research Institute, Hsin-Chu, Taiwan, March 3, 2009.
- National Cheng-Kung University, School of Medicine, Tainan, Taiwan, March 2, 2009.
- National Taiwan University, IEEE Magnetics Society, Taiwan Chapter, Taipei, March 1, 2009
- National University of Singapore, IEEE Magnetics Society, Singapore Chapter, January 30, 2009.
- S.N. Bose National Center for Basic Sciences, January 27, 2009.
- Indian Institute of Technology, Madras, India, January 16, 2009
- Indian Institute of Science, Bangalore India, Institute Lecture, January 13, 2009

PROF. KANNAN M. KRISHNAN

Publications

Books

Kannan M. Krishnan, *Fundamentals and Applications of Magnetic Materials*, 816 pages, Oxford University Press. ISBN 978-0-19-957044-7 (2016)

Refereed Journals

Submitted/In-preparation

231. R. Hufschmid, E. E. Teeman, Kannan M. Krishnan and N. Browning, "Towards a Molecular Understanding of Colloidal Stability Through Direct in-situ Visualization of Solid-Liquid Interface Dynamics", *ACS Nano* (submitted)
- 230 O. Lenz, D. Henckel, Kannan M Krishnan and B. Cossairt, "Colloidal synthesis of WSe₂ nanoflowers for catalyzing the hydrogen evolution reaction", *ACS Catalysis* (submitted)
- 234 Hamed Arami et al, "Tomographic Magnetic Particle Imaging (MPI) of Cancer Targeted Nanoparticles", *Nanoscale* (submitted)
- 223 Amit P. Khandhar, Gregory J. Wilson, Michael G. Kaul, Johannes Salamon, Caroline Jung, Kannan M. Krishnan, "Evaluating size-dependent relaxivity of PEGylated-USPIOs to develop gadolinium-free T1 contrast agents for blood pool imaging", *Journal of Biomedical Materials Research (JBMR)*, submitted

2017

- 232 Carolyn Shasha and Kannan M. Krishnan, " Harmonic simulation study of simultaneous nanoparticles size and viscosity differentiation", *IEEE Magnetics Letters* (in press)
- 231 Peter Ludewig, Nadine Gdaniec , Jan Sedlaci², Nils Daniel Forkert, Patryk Szwargulski, Matthias Graeser³, Gerhard Adam, Michael Gerhard Kaul, Kannan M. Krishnan, R. Matthew Ferguson, Amit P. Khandhar, Piotr Walczak, Jens Fiehler, Götz Thomalla, Christian Gerloff, Tobias Knopp, and Tim Magnus, "Magnetic particle imaging for real-time perfusion imaging in acute stroke", *ACS Nano* (in press)
230. Matthias Graeser, Tobias Knopp, Patryk Szwargulski, Thomas Friedrich, Anselm von Gladiss, Michael Kaul, Kannan Krishnan, Harald Ittrich, Gerhard Adam, and Thorsten M. Buzug, "*Towards Picogram Detection of Superparamagnetic Iron-Oxide Particles Using a Gradiometric Receive Coil*", *Scientific Reports*, in press DOI:10.1038/s41598-017-06992-5
229. R. Osendorff, A. J. Peck, B. Zheng, S.N. Shirazi, R.M. Ferguson, A.P. Khandhar, S.J. Kemp, P. Goodwill, Kannan M. Krishnan, g. A. Brooks, D. Kaufer and S. J. Conolly, "First in vivo traumatic brain injury imaging via magnetic particle imaging", *Phys. Med. Biol* **62**, 3501 (2017)
228. E. Y. Yu, M. Bishop, B. Zheng, R. M. Ferguson, A.P. Khandhar, S.J. Kemp, Kannan M. Krishnan, P. W. Goodwill and S. M. Conolly, "Magnetic particle imaging: a novel in vivo imaging platform for cancer detection" , *Nano Letters* **17**, 1648 (2017)
- 227 N. Gdaniec, M. Schlüter, M. Möddel, M. G. Kaul, K. Krishnan, A. Schlaefer, and T. Knopp, "Detection and Compensation of Periodic Motion in Magnetic Particle Imaging", *IEEE Trans. Med. Imag.* **36**, 1511 (2017)
- 226 Paul Keselman, Elaine Y. Yu, Xinyi Y. Zhou, Patrick W. Goodwill, Prashant Chandrasekharan, R. Matthew Ferguson, Amit P. Khandhar, Scott J. Kemp, Kannan M. Krishnan, Bo Zheng, and Steven M. Conolly, "Tracking short-term biodistribution and long-term clearance of SPIO tracers in magnetic particle imaging", *Phys. Med. Biol* **62**, 3454 (2017)
- 225 M. G. Kaul et al, "*In vitro* and *in vivo* comparison of a tailored magnetic particle imaging blood pool tracer with Resovist", *Phys. Med. Biol* **62**, 3454 (2017)

224. Zheng Li and Kannan M. Krishnan, "Misalignment-free clocking mechanism for 3-input MQCA full adder", *Jour. Appl. Phys.* **121**, 023908 (2017)
- 223 Amit Khandhar, Paul Keselman, Scott Kemp, R. M. Ferguson, P. Goodwill, S. Conolly and Kannan M. Krishnan, "An optimized blood pool tracer, LS-008, for pre-clinical Magnetic Particle Imaging", *Nanoscale* **9**, 1299 (2017)

2016

- 222 Bo Zheng, Kuan Lu, Justin J. Konkle, Daniel W. Hensley, Paul Keselman, Ryan D. Orendorff, Zhi Wei Tay, Elaine Yu, Xinyi Y. Zhou, Mindy Bishop, Beliz Gunel, Laura Taylor, R. Matthew Ferguson, Amit P. Khandhar, Scott J. Kemp, Kannan M. Krishnan, Patrick W. Goodwill, Steven M. Conolly, "Magnetic particle Imaging", in *Design and Applications of Nanoparticles in Biomedical Imaging*, edited by Jeff Bulte, Springer, 69-93 (2016)
- 221 Scott J. Kemp, R.M. Ferguson, A.P. Khandhar and Kannan M. Krishnan, "Monodisperse magnetite nanoparticles with near ideal saturation magnetization, RSC Advances, **6**, 77452 (2016).
- 220 Sonu Gandhi, Hamed Arami and Kannan M. Krishnan, "Detection of cancer specific proteases using magnetic relaxation of peptide-conjugated nanoparticles in biological environment", *Nanoletters* **16**, 3668 (2016)
- 219 Wei Zhang and Kannan M. Krishnan, "Epitaxial exchange-bias systems: from fundamentals to spin-orbitronics", *Materials Science & Engineering – R: Reports* **105**, 1-20 (2016)
- 218 Y. Bao, T. Wen, A.C. Samia, A.P. Khandhar, and Kannan M. Krishnan, "Magnetic Nanoparticles: Materials Engineering and Emerging Applications in Lithography and Biomedicine", *Jour Mater. Sci.* , **51**, 513-553 (2016)

2015

- 217 J.W.M. Bulte, P. Walczak, M. Janowski, K.M. Krishnan, H. Arami, Alekski Halkola, B. Gleich, and J. Rahmer, "Quantitative "Hot Spot" Imaging of Transplanted Stem Cells using Superparamagnetic Tracers and Magnetic Particle Imaging (MPI)", *Tomography* **1**, 91(2015)
216. Hamed Arami, Amit Khandhar, Denny Liggitt and Kannan M. Krishnan, "In vivo delivery, pharmacokinetics, biodistribution, and toxicity of iron oxide nanoparticles", *Chem. Soc. Rev.* **44**, 8576 (2015)
- 215 Asahi Tomitaka-Kami, Sonu Gandhi, Hamed Arami and Kannan M. Krishnan, "Lactoferrin conjugated iron oxide nanoparticles for targeting brain glioma cells in magnetic particle imaging", *Nanoscale*, **7**, 16890-16898 (2015).
- 214 Saqlain A. Shah, D.B. Reeves, R.M. Ferguson, J.B. Weaver, and Kannan M. Krishnan, "Mixed Néel and Brownian magnetic reversal in superparamagnetic iron-oxide nanoparticles fluid", *Phys. Rev.* **B92**, 094438 (2015)
- 213 Zheng Li, Wei Zhang⁺ and Kannan M. Krishnan, "Large-area patterning of sub-100 nm L1₀ FePt dots array", *AIP Advances.* **5**, 087165 (2015)
- 212 Ryan Hufschmid, Hamed Arami, R. M. Ferguson, Marcela Gonzales, Eric Teeman, L. Brush, N. Browning and Kannan M. Krishnan, "Synthesis of phase-pure iron oxide nanoparticles by thermal decomposition", *Nanoscale* **7**, 11142 – 11154 (2015)
- 211 C. Kuhlmann, A. P. Khandhar, R. M. Ferguson, S. Kemp, T. Wawrzik, M. Schilling, Kannan M. Krishnan and F. Ludwig, "Drive-field Frequency Dependent MPI Performance of Single-Core Magnetite Nanoparticle Tracers", *IEEE Trans. Mag.* **51**, 6500504 (2015)
- 210 Hamed Aram, Amit P. Khandhar, Asahi Tomitaka and Kannan M. Krishnan, "Multimodal magnetic particle imaging (MPI) with tailored magneto/optical contrast agents", *Biomaterials* **52**, 251 (2015)
- 209 R.M. Ferguson, A.P. Khandhar, H. Arami, E.U. Saritas, L.R. Croft, P.W. Goodwill, A. Halkola, J. Rahmer, J. Borgert, S.M. Conolly and Kannan M. Krishnan, Magnetic Particle Imaging with Safe, Tailored Iron Oxide Nanoparticle Tracers. *IEEE Trans. Med. Imag.* **34**, 1077 (2015)
- 208 Byung-Seok Kwon, Wei Zhang and Kannan M. Krishnan, "Direct release of Bio-compatible Sombrero-shaped Magnetite Nanoparticles via Nanoimprint Lithography", *Advanced Materials – Interfaces*, **2**, 1400511 (2015)

- 207 Asahi Tomitaka, R. Matthew Ferguson, Amit P. Khandhar, Scott J. Kemp, Satoshi Ota, Kosuke Nakamura, Yasushi Takemura and Kannan M. Krishnan, "Variation of Magnetic Particle Imaging tracer performance with amplitude and frequency of the applied magnetic field", *IEEE Trans. Mag.* **51**, 6100504 (2015)
- 206 Amit P. Khandhar, R. Matthew Ferguson, Hamed Arami, Scott J. Kemp, and Kannan M. Krishnan, "Tuning surface coatings of optimized magnetite nanoparticle tracers for *in vivo* Magnetic Particle Imaging", *IEEE Trans. Mag.* **51**, 5300304 (2015)

2014

- 205 F. Ludwig, C. Kuhlmann, T. Wawrzik, J. Dieckhoff, A. Lak, A.P. Khandhar, R.M. Ferguson, S.J. Kemp and Kannan M. Krishnan, "Dynamic magnetic properties of optimized magnetic nanoparticles for magnetic particle imaging", *IEEE Trans. Mag.* **50**, 5101804 (2014)
- 204 Saqlain R. Shah, R.M. Ferguson and Kannan M. Krishnan, "Slew-rate dependence of tracer magnetization response in magnetic particle imaging", *Jour. Appl. Phys.* **116**, 163910 (2014)
- 203 Yumu Takeno, Yasukazu Murakami, Takeshi Sato, Toshiaki Tanigaki, Hyun Soon Park, Daisuke Shindo, R. Matthew Ferguson, and Kannan M. Krishnan, "Morphology and magnetic flux distribution in superparamagnetic, single-crystalline Fe₃O₄ nanoparticle rings", *Appl. Phys. Lett.* **105**, 183102 (2014)
- 202 Michael Gould, Russell Barbour, Nicole Thomas, Hamed Arami, Kannan M. Krishnan, Kai-Mei Fu, "Room-temperature detection of single 20 nm super-paramagnetic nanoparticles with an imaging magnetometer", *Applied Phys. Lett.* **105**, 072406 (2014)
- 201 Wei Zhang and Kannan M. Krishnan, "Epitaxial patterning of thin films: conventional lithographies and beyond", *Jour. Micromech. & Microeng.* **24**, 093001 (2014)
200. Frank Ludwig, Hilke Remmer, Christian Kuhlmann, Thilo Wawrzik, Hamed Arami, R. Mathew Ferguson and Kannan M. Krishnan, "Self-consistent magnetic properties of magnetite tracers optimized for magnetic particle imaging measured by ac susceptometry, magnetorelaxometry and magnetic particle spectroscopy", *Jour. Mag. Mag. Mat.* **360**, 169 (2014)
199. Wei Zhang and Kannan M. Krishnan, "Exchange bias and blocking temperature distribution of Fe-film/CoO-nanoparticle hybrid bilayers", *Jour. Appl. Phys.* **115**, 17D714 (2014)
198. Zheng Li and Kannan M. Krishnan, "Misalignment-free signal propagation in nanomagnet arrays and logic gates with 45°-clocking field", *Jour. Appl. Phys.* **115**, 17E502 (2014)
197. Byung Seok Kwon, Wei Zhang and Kannan M. Krishnan, "Sombrero-shaped Fe₃O₄ nanoelements with tunable out-of-plane and in-plane magnetization components fabricated by nano-imprint lithography", *Jour. Appl. Phys.* **115**, 17B506 (2014)
196. Hamed Arami and Kannan M. Krishnan, "Intracellular performance of tailored nanoparticle tracers in Magnetic Particle Imaging", *Jour. Appl. Phys.* **115**, 17B306 (2014)
195. Tianlong Wen, Lucien Brush and Kannan M. Krishnan, "A generalized diffusion model for growth of nanoparticle synthesized by colloidal methods", *Jour. Colloid. Interfac. Sci.* **419**, 79 (2014)

2013

194. Wei Zhang and Kannan M. Krishnan, "Field- and temperature-driven magnetic reversal of spin-flop coupled epitaxial Fe/MnPd bilayers" *Phys Rev.* **B88**, 024428 (2013)
193. Ferguson RM, Khandhar A, Arami H, Hua L, Hovorka O, Krishnan KM. "Tailoring the magnetic and pharmacokinetic properties of iron oxide MPI tracers". *Biomed. Eng. Biomediz. Technik* **58**, 493 (2013)
192. Amit P Khandhar, R Matthew Ferguson, Hamed Arami and Kannan M Krishnan, "Monodisperse magnetite nanoparticle tracers for *in vivo* magnetic particle imaging", *Biomaterials* **34**, 3837 (2013)
191. R. Matthew Ferguson, Amit P. Khandhar, Christian Jonasson, Jakob Blomgren, Christer Johansson and Kannan M. Krishnan, "Size-dependent relaxation properties of monodisperse magnetite nanoparticles measured over seven decades of frequency by AC Susceptometry", *IEEE Trans. Mag.* **49**, 3441 (2013)
190. Zheng Li and Kannan M. Krishnan, "Highly stable signal propagation in a consecutively tuned nanomagnet array", *Jour. Appl. Phys.* **113**, 17B901 (2013)
189. Hamed Arami and Kannan M. Krishnan, "Highly Stable Amine Functionalized Iron Oxide

- Nanoparticles Designed for Magnetic Particle Imaging (MPI)", *IEEE Trans. Mag.* **49**, 3500 (2013)
188. Wei Zhang, Mark E. Bowden and Kannan M. Krishnan, "Nanoimprint-lithography patterned epitaxial Fe nanowire arrays with misaligned magnetocrystalline and shape anisotropies", *Jour. Appl. Phys.* **113** 17B502 (2013)
187. Hamed Arami, A.P. Khandhar, R.M. Ferguson and Kannan M. Krishnan, "Size-dependent ferrohydrodynamic relaxometry of MPI tracers in different environments", *Medical Physics* **40**, 71904 (2013)

2012

186. Wei Zhang, T. Wen and Kannan M. Krishnan, "Positive exchange bias and upward magnetic relaxation in Fe-film/CoO-nanoparticle hybrid system", *Appl. Phys. Lett.* **101**, 132401 (2012)
185. Wei Zhang and Kannan M. Krishnan, "Spin-flop coupling and bulk antiferromagnetic spin rearrangement in epitaxial exchange biased Fe/MnPd/Fe/IrMn multilayers", *Phys. Rev.* **B 86**, 054415 (2012)
184. Wei Zhang and Kannan M. Krishnan "Domain wall nucleation in epitaxial exchange-biased Fe/IrMn bilayers with highly misaligned anisotropies", *Jour. Mag. Mag. Mat.*, **324**, 3129 (2012)
183. Yi-Cheng Lee, Der-Yow Chen, Stephen J. Dodd, Nadia Bouraoud, Alan P. Koretsky and Kannan M. Krishnan, "Silica Coated MnO Nanoparticles as Responsive MRI Agents for *In vivo* Sensing of Biological Processes", *Biomaterials* **33**, 3560-7 (2012)
182. Patrick W. Goodwill, Emine U. Saritas, Laura R. Croft, Tyson Kim, Kannan M. Krishnan, and Steve Conolly, "X-Space MPI: Magnetic Nanoparticles for Safe Medical Imaging", *Advanced Materials* **24**, 3870 (2012)
181. Yu-feng Hou and Kannan M. Krishnan, "Thickness-dependent evolution of magnetization reversal in micron-scale polycrystalline Fe rings", *Jour Appl. Phys.* **111**, 033910 (2012)
180. Wei Zhang and Kannan M Krishnan, "Probing the magnetization reversal in epitaxial Fe/IrMn exchange biased bilayers using angle-dependent anisotropic magnetoresistance", *Jour Appl. Phys.* (in press)
179. Wei Zhang and Kannan M. Krishnan, "Direct release of synthetic antiferromagnetic nanoparticles fabricated by defect-free thermal imprinting", *Jour Appl. Phys.* **111**, 07B509 (2012)
178. R. Matthew Ferguson, Amit P. Khandhar and Kannan M. Krishnan, "Tracer design for magnetic particle imaging", *Jour Appl. Phys.* **111**, 07B318 (2012)
177. Amit P. Khandhar, R. Matthew Ferguson, Julian A. Simon and Kannan M. Krishnan, "Enhancing cancer therapeutics using size-optimized magnetic fluid hyperthermia", *Jour Appl. Phys.* **111**, 07B306 (2012)
176. Yu-feng Hou and Kannan M. Krishnan, "Thickness-dependent magnetization reversal behavior of lithographic IrMn/Fe ring structures", *Jour Appl. Phys.* **111**, 07B905 (2012)
175. A. Khandhar, R. Matthew Ferguson, Julian A. Simon and Kannan M. Krishnan, "Optimizing and tailoring magnetic particles for *In vitro* Magnetic Fluid Hyperthermia", *Jour. Biomedical Materials Research, Part A*, **100A**, 728-737 (2012)
174. Patrick Goodwill, Kannan M. Krishnan, and Steven Conolly, "Magnetic Particle Imaging for Angiography, Stem Cell Tracking, Cancer Imaging, and Inflammation Imaging" in *Magnetic Nanoparticles: From Fabrication to Clinical Applications*, ed. N.T.K. Thanh, CRC Press (2012)

2011

173. Tianlong Wen and Kannan M. Krishnan, "Magnetic Nanocomposites: Fundamentals, fabrications and applications", *Jour. Phys. D: Appl. Phys* **44**, 393001 (2011).
172. P. W. Goodwill, A. Tamrazian, L. R. Croft, C. D. Lu, E. M. Johnson, R. Pidaparathi, R. M. Ferguson, A. P. Khandhar, K. M. Krishnan, and S. M. Conolly, "Ferrohydrodynamic Relaxometry for Magnetic Particle Imaging", *Appl. Phys. Lett.* **98**, 262502 (2011)
171. J. S. Jeong, Zentaro Akase, Daisuke Shindo, Qing-feng Zhan and Kannan M. Krishnan, "Electron holography study of remanence states in exchange-biased MnPd/Fe bilayers grown epitaxially on MgO(001)", *Jour. Elect. Mic.*, doi: 10.1093/jmicro/dfr015
170. W. Zhang, D. N Weiss and Kannan M Krishnan, "Thermal nanoimprint process for high-

- temperature fabrication of epitaxial exchange-biased metallic nanostructures”, *Jour. Micromech. Microeng.* **21**, 045204 (2011)
169. S.Yoon and Kannan M. Krishnan, “Temperature dependence of magnetic anisotropy constant in manganese ferrite nanoparticles at low temperature”, *Jour. Appl. Phys.* **109**, 07B534 (2011)
168. T. Wen and Kannan M. Krishnan, “Magnetic properties of Au_{core}-Co_{shell} nanoparticles”, *Jour. Appl. Phys.* **109**, 07B515 (2011)
167. A. P. Khandhar, R. Matthew Ferguson and Kannan M. Krishnan, “Monodispersed Magnetite Nanoparticles Optimized for Magnetic Fluid Hyperthermia: Implications in Biological Systems”, *Jour. Appl. Phys.* **109**, 07B310 (2011)
166. W. Zhang, Mark E. Bowden and Kannan M. Krishnan, “Competing effects of magnetocrystalline anisotropy and exchange bias in epitaxial Fe/IrMn bilayer”, *Appl. Phys. Lett.* **98**, 092503 (2011)
165. R. M. Ferguson, A. P. Khandhar, K. Minard and Kannan M. Krishnan, “Optimizing magnetite nanoparticles for mass sensitivity in magnetic particle imaging”, *Med. Phys.* **38**, 1619 (2011)
164. Qing-feng Zhan, Wei Zhang, and Kannan M. Krishnan, “Antiferromagnetic layer thickness dependence of magnetization reversal in epitaxial MnPd/Fe exchange bias system”, *Phys. Rev. B* **83**, 094404 (2011)
- 163 Yu-feng Hou, Qing-feng Zhan, and Kannan M. Krishnan, “Magnetization reversal in exchange biased IrMn/Fe ring arrays”, *Appl. Phys. Lett.* **98**, 042510 (2011)

2010

162. W.X. Xia, Y.S. Chun, S. Aizawa, K. Yanagisawa, Kannan M. Krishnan, D. Shindo and A. Tonomura, “Investigation of magnetic structure and magnetization process of yttrium iron garnet film by Lorentz microscopy and electron holography”, *Jour. Appl. Phys.* **108**, 123919 (2010)
161. R. M. Ferguson, A. P. Khandhar, K. Minard and Kannan M. Krishnan, “Size-optimized magnetite nanoparticles for magnetic particle imaging”, in T. M. Buzug, J. Borgert, T. Knopp, S. Biederer, T. F. Sattel, M. Erbe, K. Lüdtke-Buzug (Eds.): *Magnetic Nanoparticles: Particle Science, Imaging Technology, and Clinical Applications*, World Scientific Publishing Company, 2010
160. Tianlong Wen and Kannan M. Krishnan, “Thermal stability and morphological transformations of Au_{core}Co_{shell} nanocrucibles”, *Jour. Phys. Chem. C* **114**, 14838-42 (2010)
- 159 Tapan Chatterji, Yixi Su, Gail N. Iles, Yi-Cheng Lee, Amit Khandhar and Kannan M. Krishnan, “Antiferromagnetic spin correlations in MnO nanoparticles”, *Jour. Mag. Mag. Mat.* **322**, 3333-6 (2010)
158. M. Gonzales, L. Mitsumori, J. Kushleika, M. Rosenfeld, Kannan M. Krishnan “Cytotoxicity of iron oxide nanoparticles made from the thermal decomposition of organometallics and aqueous phase transfer with Pluronic F127”, *Contrast Media and Molecular Imaging*, **5**, 286-293 (2010)
157. Kannan M. Krishnan, “Biomedical Nanomagnetism: a spin through new possibilities in imaging, diagnostics and therapy”, *IEEE Trans. Mag.* **46**, 2523-2558 (2010)
156. Tianlong Wen, Wenkel Liang and Kannan M. Krishnan, “Coupling of blocking and melting in cobalt ferrofluids”, *Jour. Appl. Phys.* **107**, 09B501 (2010)
- 155 Q. Zhan and Kannan M. Krishnan, “Angular dependence of magnetization reversal process in exchange biased epitaxial MnPd/Fe bilayers”, *Jour Appl. Phys.* **107**, 09D703 (2010)
154. Wei Zhang, D. N. Weiss and Kannan M. Krishnan. “Competing anisotropies and temperature dependence of exchange bias in Co/IrMn metallic wires fabricated by nanoimprint lithography”, *Jour. Appl. Phys.* **107**, 09D724 (2010)
- 153 Yi-cheng Lee, A.B. Pakhomov and Kannan M. Krishnan, “Size-driven magnetic transitions in monodisperse MnO nanocrystals”, *Jour Appl. Phys.* **107**, 09E124 (2010)
152. Sebastian Brück, Xiaosong Ji, Sebastian Macke, Q. Zhan, Kannan M. Krishnan and Eberhard Goering, “Coupling of Fe and uncompensated Mn moments in exchange biased Fe/MnPd”, *Phys. Rev. B* **81** 134414 (2010)
- 151 Q. Zhan and Kannan M. Krishnan, In-plane reorientation of magnetization in epitaxial exchange biased Fe/MnPd bilayers, *Appl. Phys. Lett.* **96**, 112506 (2010)
150. Yuping Bao, Wei An, C. Heath Turner and Kannan M. Krishnan, “The Critical Role of Surfactants in the Growth of Cobalt Nanoparticles”, *Langmuir*, **26**, 478 (2010)

2009

149. T. Wen, D. Liu, C. Luscombe and Kannan M. Krishnan, "Granular giant magnetoresistance in P3HT/Fe₃O₄ hybrid system", *Appl. Phys. Lett.*, **95**, 082509 (2009)
148. S. Kalale, R. Narain and Kannan M. Krishnan, "Probing Temperature-Sensitive Behavior of pNIPAAm Coated Iron Oxide Nanoparticles Using Frequency Dependent Magnetic Measurements", *Jour. Mag. Mag. Mat.* **321**, 1377-1380 (2009)
147. R. M. Ferguson, K.P. Minard and Kannan M. Krishnan, "Optimization of nanoparticle core size for magnetic particle imaging," , *Jour. Mag. Mag. Mat.* **321**, 1548-1551 (2009).
146. Marcela Gonzales, Matthias Zeisberger and Kannan M. Krishnan, "Size-dependant heating rates of iron oxide nanoparticles for magnetic fluid hyperthermia", *Jour. Mag. Mag. Mat.*, **321**, 1947-1950 (2009)
145. S.-H. Yoon, M. Gonzales, Y.-C. Lee, and Kannan M. Krishnan, "Morphological investigations of monodispersed manganese ferrite particles by impedance measurements" , *J. Appl. Phys.* **105** 07B507 (2009)

2008

144. S. Bruck, E. Goering, G. Schutz, X. Ji and Kannan M. Krishnan, "Uncompensated magnetic moments in the MnPd/Fe exchange bias system", *Phys. Rev. Lett.* **101**, 126402 (2008)
143. K. Griffin Roberts, M. Varela, S. Rakshev, S. Pantelides, S. J. Pennycook and Kannan M. Krishnan¹. "Defect-mediated ferromagnetism in insulating Co-doped anatase TiO₂ thin films", *Phys. Rev. B* **78**, 014409 (2008)
142. B.K. Roberts, A.B. Pakhomov and Kannan M. Krishnan, "Size scaling of spontaneous magnetization in Cr:ZnO dilute magnetic dielectric thin films", *Appl. Phys. Lett.*, **92**, 162511 (2008)
141. B. K. Roberts, A.B. Pakhomov and Kannan Krishnan, "Effect of hydrogen co-doping on magnetic ordering and conductivity in Cr:ZnO thin films, *Jour. Appl. Phys.*, **103**, 07D133 (2008)

2007

140. Y. Gao, D. Shindo, Y. Bao and Kannan M. Krishnan, "Electron holography of core-shell Co/CoO spherical nanocrystals", *Appl. Phys. Lett* **90**, 233105(2007)
139. R. Narain, M. Gonzales, P. Stayton and Kannan Krishnan, "Facile Synthesis of Biotinylated p(NIPAM)-Coated Iron Oxide nanoparticles and their Bioconjugation to Streptavidin", *Langmuir*, **23**, 6299-6304 (2007)
138. K. J. Kennewell, Xiaosong Ji, J-G Hu, R. C. Woodward, K. M. Krishnan, R. L. Stamps, "Measuring exchange anisotropy in Fe/MnPd using inductive magnetometry", *Jour. Appl. Phys.*, **101**, 09E518 (2007)
137. X. Ji, A. B. Pakhomov and Kannan M. Krishnan, "Asymmetry magnetic reversal of perpendicular exchange-biased (Co/Pt)₅/IrMn probed by magnetoresistance and magnetic force microscopy", *Jour. Appl. Phys.*, **101**, 09E507 (2007)
136. Y.S. Chun, H. Ohldag and Kannan M. Krishnan "Spin reorientation transitions in perpendicularly exchange-coupled, ferromagnetic, ultra-thin films studied using element specific imaging", *IEEE Trans. Mag.*, **43**, 3004-3006 (2007)
135. Yuping Bao, Hector Calderon and Kannan M. Krishnan, "Synthesis and characterization of magneto-optical Co_{core}Au_{shell} nanoparticles", *Jour. Phys. Chem. C* **111**, 1941-1944 (2007)
134. Marcela Gonzales and Kannan M. Krishnan, "Phase Transfer of Highly Monodisperse Iron Oxide Nanocrystals with Pluronic FI27 for Biological Applications", *Jour. Mag. Mag. Mat.*, **311**, 59-62 (2007)
133. Saikat Mandal and Kannan M. Krishnan, "Co_{core}Au_{shell} nanoparticles: evolution of magnetic properties in the displacement reaction". *J. Mater. Chem.*, **17**, 372-376 (2007)

2006

132. G. Srajer, L. H. Lewis, S.D. Bader, ... Kannan M. Krishnan ...J.Z. Sun, "Advances in nanomagnetism via x-ray techniques", *Jour. Mag. Mag. Mat.*, **307**, 1-31 (2006)

131. Xiaosong Ji and Kannan M. Krishnan “Competing magnetic interactions in perpendicular exchange-biased (Co/Pt)_n/FeMn multilayers”, *Jour. Appl. Phys.* **99**, 08C105 (2006)
- 130 K. A. Griffin, M. Varela, S. J. Pennycook and Kannan M. Krishnan, “Atomic-scale studies of cobalt distribution in Co-TiO₂ anatase thin films: Processing, microstructure and the origin of ferromagnetism”, *Jour. Appl. Phys.* **99**, 08M114 (2006)
- 129 Yuping Bao, A. B. Pakhomov and Kannan M. Krishnan, “Brownian Magnetic Relaxation of Water-based Cobalt Nanoparticles”, *Jour. Appl. Phys.* **99**, 08H107 (2006)
128. Youhui Gao, Yuping Bao, Alec B. Pakhomov, Daisuke Shindo and Kannan M. Krishnan, “Spiral Spin Order of Self-assembled Co Nanodisk Arrays”, *Physical Review Letters*, **96**, 137205 (2006)
127. Kannan M. Krishnan, Alexandre B. Pakhomov, Yuping Bao, Peter Blomqvist, Yoonsoo Chun, Marcela Gonzales, Kelli Griffin, Xiaosong Ji and Bradley K. Roberts, “Nanomagnetism and spin electronics: materials, microstructure and novel properties”, *Jour. Mat. Sci.* **41**, 793–815 (2006)

2005

126. Xiaosong Ji, Honglyou Ju, David E. McCready and Kannan M. Krishnan, “Perpendicular exchange bias in ion-beam sputtered (Co/Pt)_n/FeMn multilayers” , *Jour. Appl. Phys.* **98**, 116101 (2005)
125. M. E. Gómez, J. Santamaria , S. Kim , Kannan M. Krishnan and Ivan K. Schuller¹, Detailed structural analysis of epitaxial MBE grown Fe/Cr superlattices, *Phys. Rev. B*, **71** , 125410 (2005)
124. K.A. Griffin, A.B. Pakhomov, C.M. Wang, S.M. Heald, and Kannan M. Krishnan, “Cobalt-Doped Anatase – a room temperature dilute magnetic dielectric material”, *Jour. Appl. Phys.*, **97**, 10D320 (2005)
123. Y. Bao, M. Beerman, A.B. Pakhomov and Kannan M. Krishnan, “Controlled crystalline structure and surface stability of cobalt nanocrystals”. *J. Phys. Chem. B*, **109**, 7220-7222 (2005)
122. P. Blomqvist, Kannan. M. Krishnan and H. Ohldag, “Direct imaging of asymmetric magnetization reversal in exchange-biased Fe/MnPd bilayers by x-ray photoemission electron microscopy”, *Phys. Rev. Lett.*, **94**, 107203 (2005)
121. K.A. Griffin, A.B. Pakhomov, C.M. Wang, S.M. Heald, Kannan M. Krishnan, “Intrinsic Ferromagnetism in Insulating Cobalt Doped Anatase TiO₂ thin films”, *Phys. Rev. Lett.*, **94**, 157204 (2005)
120. Bradley K. Roberts, Alexandre B. Pakhomov and Kannan M. Krishnan, “Ferromagnetic Cr-doped ZnO for spin-electronics via magnetron sputtering”, *Jour. Appl. Phys.*, **97**, 10D310 (2005)
119. A. B. Pakhomov, Yuping Bao and Kannan M. Krishnan, “Effects of surfactant friction on Brownian magnetic relaxation in nanoparticle ferrofluids”, *Jour. Appl. Phys.*, **97**, 10Q305 (2005)
118. Marcela Gonzales and Kannan M. Krishnan, “Synthesis and dynamic magnetic behavior of highly monodisperse iron oxide nanocrystals”, *Jour. Appl. Phys.*, (submitted)
117. Y. Bao, A.B. Pakhomov, K. M. Krishnan, “ A general approach to synthesize nanoparticles with controlled morphologies and magnetic properties” *Jour. Appl. Phys.*, **97**, 10J317 (2005)
116. Yuping Bao and Kannan Krishnan, “Preparation of functionalized and gold coated cobalt nanoparticles for biomedical applications”. *J. of Mag. Mag. Mat.* , **293**, 15-19 (2005)
115. W. Grogger, Maria Varela, Roger Ristau, Bernard Schaffer, Ferdinand Hofer and Kannan M. Krishnan, “Energy-filtering TEM on the nanometer length scales” *Journal of Electron Spectroscopy*, **143**, 139-147 (2005)
114. Marcela Gonzales and Kannan Krishnan, “Synthesis of Magnetoliposomes with Monodisperse Iron Oxide Nanocrystal Cores for Hyperthermia”, *Journal of Magnetism and Magnetic Materials*, **293**, 265-270 (2005)

2004

113. P. Blomqvist, Kannan. M. Krishnan, S. Srinath and S.G.E. te Velthuis, “Magnetization processes in exchange-biased MnPd/Fe bilayers studied by polarized neutron reflectivity”, *Jour. Appl. Phys.* **96**, 6523-6526 (2004)
112. Tuan, A.; Bryan, J.D.; Pakhomov, A.B.; Shutthanandan, V.; Thevuthasan, S.; McCready, D.; Gaspar, D.; Engelhard, M.; Rogers, Jr., J.W.; Krishnan, K.; Gamelin, D.R.; Chambers S.A.; "Epitaxial Growth and Properties of Cobalt-doped ZnO on a-Al₂O₃ Single Crystal Substrates." *Physical Rev. B* **70**,

054424 (2004)

111. Yuping Bao, Michael Beerman and Kannan M. Krishnan, "Controlled Self-assembly of Colloidal Cobalt Nanocrystals mediated by magnetic interactions, *Journal of Magnetism and Magnetic Materials*, **272-276**, Supplement 1, E1367-E1368 (2004)
110. A. B. Pakhomov, B. K. Roberts, Kannan M. Krishnan, A. Tuan, V. Shutthanandan, D. McCready, S. Thevuthasan, and S. A. Chambers, Studies of two- and three- dimensional ZnO:Co structures through different synthetic routes, *Jour. Appl. Phys* **95** (11): 7393-7395 (2004)
109. Peter Blomqvist and Kannan M. Krishnan, "Exchange coupling in nanoscale MnPd/Fe heterostructures", *Journal of Magnetism and Magnetic Materials* **272-76**: 1237-1239 (2004)
108. Gao YH, Bao YP, Beerman M, Yasuhara A, Shindo D, Krishnan KM, "Superstructures of self-assembled cobalt nanocrystals", *Appl. Phys. Lett* **84** , 3361-3363 (2004)
107. P. Blomqvist and Kannan M. Krishnan, "Magnetization process in exchange-biased MnPd/Fe bilayers", *Jour. Appl. Phys* **95** (12): 8487-8489 (2004)
106. P. Blomqvist Kannan M. Krishnan and D.E. McCready, "Growth of exchange-biased MnPd/Fe bilayers", *Jour. Appl. Phys* **95** (12): 8019-8022 (2004)
105. Y.S. Chun and Kannan M. Krishnan, "Interlayer perpendicular domain coupling between thin Fe films and garnet single-crystal underlayers", *Jour. Appl. Phys.*, **95** (11): 6858-6860 (2004)

2003

104. J. Santamaria, M. E. Gomez, J. L. Vincent, Kannan M. Krishnan and I. Schuller, "Santamaria et al reply", *Physical Review Letters*, **91**, 119602 (2003)
103. Grogger W, Schaffer B, Krishnan KM, Hofer F, Energy-filtering TEM at high magnification: spatial resolution and detection limits, *Ultramicroscopy* **96**, 481-489 (2003).
102. A. Pakhomov, B. Roberts and Kannan Krishnan, "Transition from granular to dilute magnetic semiconducting multilayers in iron beam deposited ZnO/Co" *Appl. Phys. Lett.* **83**, 4357-4359 (2003)
101. Yuping Bao, Michael Beerman and Kannan M. Krishnan, "Controlled self-assembly of colloidal cobalt nanocrystals", *Jour. Mag. Mag. Mat.*, **266**, L245 (2003)
100. Kusinski GJ, Kannan M. Krishnan, Denbeaux G and Thomas G, "Magnetic Reversal of ion-beam patterned Co/Pt multilayers", *Scripta Materialia* **48**, 949-954 (2003)

2002

99. M. Varela, W. Grogger, D. Arias, Z. Sefrious, C. Leon, L. Vasquez, C. Ballesteros, K. M. Krishnan and J. Santamaria, " Effect of epitaxial strain on growth mechanisms in YBCO thin films in YBCO/PBCO superlattices," *Phys. Rev B*.**66**, 174514 (2002)
98. Gomez ME, Santamaria J, Cyrille MC, Nelson EC, Krishnan KM, Schuller IK, Quantitative roughness of sputtered Fe-Cr superlattices, *Europ. Phys. Jour. B* **30**, 17-23 (2002)
97. J. Santamaria, M.E. Gomez, J.L. Vicent, Kannan M. Krishnan and I. Schuller, "Scaling of the interface roughness in superlattices: Self-affine vs non self-affine", *Phys. Rev. Lett.*, **89**, 190601 (2002)
96. D. C. Crew, Er. Girt, M. Guilot, D. Suess, T. Schrefl and Kannan M. Krishnan, " Magnetic interactions and reversal behavior of Nd₂Fe₁₄B particles diluted in Nd matrix", *Phys. Rev. B* **66**, 184418 (2002)
95. V.F. Puentes, Kannan M. Krishnan, A.P. Alivisatos, "Synthesis of colloidal cobalt nanoparticles with controlled size and shapes," *Topics in Catalysis*, **19**, 145 (2002).
94. Werner Grogger, Roger A. Ristau, Thomas T. Thomson, Samuel D. Harkness, Rajiv Ranjan and Kannan M. Krishnan, "Quantitative measurements of Cr-segregation in Co_{0.8-x}Cr_xPt_{0.1}B_{0.1} magnetic recording media by scatter diagram analysis", *Appl. Phys. Lett.* **80**, 1165 (2002)
93. Kusinski GJ, Thomas G, Denbeaux G and Kannan Krishnan Kannan M. Krishnan "Temperature and ion irradiation dependence of magnetic domains and microstructure in Co/Pt multilayers" *J Appl. Phys.* **91** (10): 7541-7543 (2002)
92. J. Santamaria, Me. Gomez, M.C. Cyrille, C. Leighton, Kannan M. Krishnan and I. K. Schuller, " Interfacially dominated giant magnetoresistance in Fe/Cr superlattices", *Phys. Rev. B*. **65**, 12412 (2002)

2001

91. Girt E, Krishnan KM, Thomas G, "Optimization of magnetic properties of nanostructured Nd-Fe-B: Approaching ideal Stoner-Wohlfarth behaviour", *Scripta Materialia* **44**: 1431-1435 (2001)
90. V. F. Puentes, Kannan M. Krishnan and P.A. Alivisatos, "Colloidal Nanocrystal Size and Shape Control: the Case of Co", *Science*, **291**, 2115-2117 (2001).
89. V. F. Puentes, Kannan M. Krishnan and P. Alivisatos, "Synthesis, self-assembly and magnetic behavior of a two-dimensional superlattice of single-crystal e-Co nanoparticles" *Appl. Phys. Lett.*, **78**, 2187-2189 (2001)
88. Y. Zhang, W. Tang, G.C. Hadjipanyis, C. Chen, C. Nelson and Kannan M. Krishnan, " Evolution of microstructure, microchemistry and coercivity in 2:17 type Sm-Co magnets with heat treatment ", *IEEE Trans Mag.* **37**, 2525 (2001)
87. Er. Girt, Kannan M. Krishnan, G. Thomas and E. Girt, "Coercivity limits and mechanism in nanocomposite Fe-Nd-B alloys", *J. Mag. Mag. Mat.*, **231**, 219-230 (2001)
86. R. C. Woodward, N.T. Gorham, R. Street, D.C. Crew, E. Girt and Kannan M. Krishnan, "Coercivity, time dependence and reversible magnetisation in Nd-rich Nd-Fe-B alloys", *IEEE Trans. Mag.* **37**, 2493-2496 (2001)
85. D. Weller. L. Folks, M. Best, E.E. Fullerton, B.D. Terris, G. J. Kusinski, Kannan M. Krishnan and G. Thomas, 'Growth, structural and magnetic properties of high-coercivity Co/Pt multilayers', *Jour. Appl. Phys.*, **89**, 7525-7527 (2001)
84. G.J. Kusinski, K.M. Krishnan, G. Denbeaux, G. Thomas, B.D. Terris and D. Weller "Magnetic imaging of ion- irradiation-patterned Co/Pt multilayers using complementary electron and photon probes", *Appl. Phys. Lett.* **79**, 2211-2213 (2001)
83. V. F. Puentes and Kannan M. Krishnan , "Synthesis, structural order and magnetic behavior of self-assembled ϵ -Co nanocrystal arrays" , *IEEE Trans. Mag.* **37**, 2210-2213 (2001)
82. J. D. Wright and Kannan M. Krishnan, "Modification of the magnetic properties of longitudinal thin-film media by ion-beam irradiation", *Appl. Phys. Lett.* (in press)
81. Werner Grogger and Kannan M. Krishnan "Scatter diagram analysis of Cr segregation in Co-Cr based recording media", *IEEE Trans Mag.* **37**, 1465-1467 (2001)
80. Ning Cheng, J.P.Ahn and Kannan M. Krishnan " Epitaxial growth and exchange biasing of PdMn/Fe bilayer structures grown by ion-beam sputtering" *J. Appl. Phys.* **89**, 6597-6599 (2001)
79. JaePyong Ahn, Ning Cheng, T. Lograsso and Kannan M. Krishnan, "Magnetic properties, structure and shape-memory transitions in $\text{Ni}_{60}\text{Mn}_{20}\text{Ga}_{20}$ thin films grown by ion beam sputtering", *IEEE Trans Mag.* **37**, 2141-2143 (2001)
78. M. Varela, W. Grogger, D. Arias, Z. Sefrioui, C. Leon, C. Ballesteros, Kannan M. Krishnan, and J. Santamaria, "Direct evidence for block-by-block growth in high-temperature superconductor ultra-thin films, *Phys. Rev. Lett.*, **86**, 5156 (2001)
77. M. Varela, C. Ballesteros, W. Grogger, Kannan M. Krishnan, D. Arias, Z. Sefrioui, C. Leon and J. Santamaria, "High-Resolution and Energy-Filtered Transmission Electron Microscopy of $\text{YBa}_2\text{Cu}_3\text{O}_{7-x}$ / $\text{PrBa}_2\text{Cu}_3\text{O}_7$ superlattices" , *J. Alloys and Compounds* **323-4**, 558-561 (2001)
76. Kannan M. Krishnan , "Magnetism and Microstructure: Imaging Techniques and Structure-Property Correlations in Information Storage Materials", NATO/ASI on Magnetic recording beyond 2000, Edited by G. Hadjipanayis, pp 251, Kluwer Academic press (2001)

2000

75. Y. Zhang, W. Tang, G. C. Hadjipanayis, J. Liu, M. S. Walmer, E. C. Nelson and Kannan M. Krishnan, "Effect of cell size on magnetic properties and domain structures of sintered Sm(Co,Cu,Fe,Zr) 2:17 magnets", *J. Appl. Phys.* **87** (9): 6722-6724 (2000)
74. M. C. Cyrille, S. Kim, M. E. Gomez, J. Santamaria, C. Leighton, Kannan M. Krishnan and I. K. Schuller, "Effect of sputtering pressure induced roughness on the microstructure and perpendicular GMR of Fe/Cr superlattices", *Phys. Rev. B.* **62**, 15079-15083 (2000)

73. M. C. Cyrille, S. Kim, M.E. Gomez, J. Santamaria, K. M. Krishnan and I. K. Schuller, "Enhancement of perpendicular and parallel giant magnetoresistance with the number of bilayers in Fe/Cr superlattices", *Phys. Rev. B*, **62**, 3361-3367 (2000)
72. Y. Zhang, M. Corte-Real, G.C. Hadjipanayis, J. Liu, M. S. Walmer and Kannan Krishnan, "Magnetic hardening studies in sintered Sm(Co, Cux, Fe, Zr)₂:17 high temperature magnets" *J. Appl. Phys.* **87**, 6722 (2000)
71. G. Kusinski, Kannan M. Krishnan, G. Thomas and E. C. Nelson, Domain structures and temperature-dependent spin-reorientation transitions in c-axis oriented Co-Cr thin films", *J. Appl. Phys.*, **87**, 6376 (2000)
70. Ning Cheng, Kannan M. Krishnan, Er. Girt, R. F. C. Farrow, R. Marks, A. Young, Cheng H. A., "Spin Structure and Exchange Biasing in MnNi/Fe(Mo) Bilayers, *J. Appl. Phys.* **87**, 6647-6649 (2000)
69. Er. Girt, Kannan M. Krishnan, M. Guillot, I. P. Swainson, Z. Altounian, G. Thomas, "Structural and magnetic properties of Nd₂Fe_{17-x}Gax (x = 0 - 2)", *J. Appl. Phys.* **87**, 5323-5325 (2000)
68. Er. Girt, Kannan M. Krishnan, G. Thomas, Z. Altounian, "Approaching the theoretical coercivity of Nd₂Fe₁₄B : microstructural evaluation and interparticle interactions", *J. Appl. Phys.* **88**, 5311-5314 (2000)
67. Er. Girt, Kannan M. Krishnan, G. Thomas, Z. Altounian, "Nanocomposite Nd-rich Nd-Fe-B alloys: approaching ideal Stoner-Wohlfarth type behavior", *Appl. Phys. Lett.* **76**, 1746-1748 (2000)
66. O.I. Lebedev, C. Van Tandeloo, S. Amelinckx, H. L. Ju and Kannan M. Krishnan, "HREM study of strained epitaxial La_{0.7}Sr_{0.3}MnO₃ thin films, *Phil Mag A*, **90**, 673-691 (2000)
65. X. Batlle, C.J. Echer, C. Nelson and Kannan M. Krishnan, "Antiferromagnetic correlations in Fe-Cu granular alloys: the role of surface structure" , *J. Appl. Phys.*, **87**, 3037-3043 (2000)

1999

64. X. Batlle, C. J. Echer, Kannan M. Krishnan, B. J. Hattnik and A. Labarta, "Structural and magnetic properties of iron particles in a copper matrix" , *J. Mag. Mag. Mat.*, **203**, 120-122 (1999).
63. Kannan M. Krishnan, " Magnetism and microstructure: the role of interfaces", *Acta Materialia*, **47**, 4233-4244 (1999)
62. Kannan M. Krishnan and H. L. Ju, "Role of stoichiometry and structure in colossal magneto-resistive La_{1-x}Sr_xMn_{1-y}Ru_yO_{3+d} ", *Phys. Rev (B)*, **60**, 14793-14803 (1999)
61. E. Girt, Z. Altounian, I.P. Swainson, Kannan M. Krishnan and G. Thomas, "Anomalous thermal expansion in Nd₂Fe_{17-d} Ga_d (d = 0-2)", *J. Appl. Phys.*, **85**, 4669-4671 (1999)

1998

60. H. L. Ju, Kannan M. Krishnan and D. Lederman, "Evolution of strain dependent transport properties in ultra-thin LSMO films", *Jour. Appl. Phys.*, **83**, 7073-7075 (1998).
59. S. Sundar Manoharan, H. L. Ju and Kannan M. Krishnan, " Unusual substitution effect of Ru in bulk and thin films of La_{0.7}Sr_{0.3}Mn_{1-x}Ru_xO₃" , *Jour. Appl. Phys.*, **83**, 7183-7185 (1998)
58. Kannan M. Krishnan, C. Nelson and C.J. Echer, R. F. C. Farrow and R.F. Marks, "Exchange biasing of permalloy films by Mn_{1-x} Pt_x: role of composition and microstructure", *Jour. Appl. Phys.*, **83**, 6810-6812(1998)
57. M. Benaissa, Kannan M. Krishnan and E.E.Fullerton, "Magnetic anisotropy and its microstructural origin in epitaxially grown bicrystal Sm-Co thin films", *IEEE Trans. Mag.*, **34**, 1204-1206 (1998)

1997

56. H. L. Ju, H.C. Sohn and Kannan M. Krishnan, " Evidence for oxygen 2p hole driven conductivity in La_{1-x}Sr_xMnO₃ and La_{0.8}Sr_{0.2}MnO₂ CMR thin films", *Phys. Rev. Lett.*, **79**, 3230-3233 (1997)
55. H. L. Ju and Kannan M. Krishnan, "Effect of vacuum annealing on oxygen stoichiometry and resistivity in sol-gel derived films", *Sol. Stat. Comm.* , **104**,419-423 (1997)
54. M. A. Brewer, C. J. Echer, Kannan M. Krishnan, T. Kobayashi and A. Nakanishi, " Magnetic and physical microstructure of Fe₁₆N₂ films grown epitaxially on Si(001)", *Jour. Appl. Phys.*, **81**, 4128-4130 (1997)

53. D. J. Rogers, Y. Maeda and Kannan M. Krishnan, "Investigations of the compositional distribution in epitaxially grown Co-Cr thin films with enhanced saturation magnetisation", *J. Mag. Mag. Mat.* **163**, 393-396 (1997)

1996

52. M. A. Brewer, Kannan M. Krishnan and C. Ortiz, "Epitaxial Fe₁₆N₂ Films Grown on Si(100) by Reactive Sputtering", *J. Appl. Phys.*, **79**, 5321-5323 (1996).
51. Tai Nguyen, Kannan M. Krishnan, L. H. Lewis, Y. Zhu and D.O. Welch, "Microstructure and composition in rapidly quenched FeNdB-based hard magnet alloys", *J. Appl. Phys.*, **79**, 4848-4850 (1996)
50. Kannan M. Krishnan, A. R. Modak, C. A. Lucas, H. Baumann and R. Michel, "Role of epitaxy and polycrystallinity in the magneto- resistance and magnetization of La_{0.8}Sr_{0.2}MnO₃ thin films", *J. Appl. Phys.*, **79**, 5169-5171 (1996)
49. S. Anders, S. Raoux, Kannan M. Krishnan, R. A. MacGill and I. G. Brown, "Plasma distribution of cathodic arc deposition systems", *J. Appl. Phys.*, **79**, 6785 (1996)
48. R. F. C. Farrow, S. S. P. Parkin, R. F. Marks, Kannan M. Krishnan and N. Thangaraj, "Quenching of giant magnetoresistance by interface roughening and alloying in annealed [(Ni_xFe_{1-x})_yAu_{1-y}]/Au multilayers", *Appl. Phys. Lett.*, **69**, 1963-1965 (1996)

1995

47. N. Thangaraj, Kannan M. Krishnan and R. F. C. Farrow, "Microstructural evolution and giant magnetoresistance in multilayers and granular alloy thin films", *Scripta Met.*, **33**, 1667-1677 (1995)
46. D. Donnet, Kannan M. Krishnan and Y. Yajima, "Domain structures in epitaxially grown cobalt thin films", *Jour. Phys. D.*, **28**, 1942-1950 (1995)
45. Kannan M. Krishnan, "Enhanced saturation magnetization, electronic structure and compositional segregation in epitaxially grown Co-Cr thin films", *Appl. Phys. Lett.*, **67**, 2238-2240 (1995)

1994

44. Kannan M. Krishnan, T. Takeuchi, Y. Hirayama and M. Futamoto, "Epitaxial growth and enhanced saturation magnetization of Co_{1-x}Cr_x media suitable for perpendicular magnetic recording." *IEEE Trans. Mag.* **30**, 5115-5120 (1994).
43. Kannan M. Krishnan, T. Takeuchi, Y. Hirayama, D. M. Donnet, Y. Honda and M. Futamoto, "Micromagnetics and microstructure of epitaxially grown Co and Co-Cr films suitable for perpendicular magnetic recording", *Jour. Mag. Soc. Jap.*, **18**, S1, 15 (1994)
42. N. Thangaraj, C. J. Echer, Kannan M. Krishnan, R.F.C. Farrow, R. F. Marks and S. S. P. Parkin "Giant magnetoresistance and microstructural characteristics of epitaxial FeAg and CoAg granular thin films, *Jour. Appl. Phys.*, **75**, 6900-6902 (1994).
41. Kannan M. Krishnan, T. Takeuchi, D. M. Donnet and T. Tanahashi, "Magnetism and magnetization structure of c-axis oriented single crystal cobalt films grown epitaxially on rigid underlayers", *Jour. Appl. Phys.*, **75**, 7579-7581 (1994)
40. Kannan M. Krishnan, Y. Honda, Y. Hirayama and M. Futamoto, "Microstructure and epitaxy of c-axis oriented single crystal cobalt films grown on rigid underlayers", *Appl. Phys. Lett.*, **64**, 1499-1501 (1994)

1993

39. B. Zhang, Kannan M. Krishnan and R.F.C. Farrow, "Crystallography of ultrathin Co/Pt multilayers and nanostructures", *Ultramicroscopy*, **51**, 298-305 (1993)
38. B. Zhang, Kannan M. Krishnan, C.H. Lee and R. F. C. Farrow, "Magnetic anisotropy and lattice strain in Co/Pt multilayers", *Jour. Appl. Phys.*, **73**, 6198-6200 (1993).

1992

37. E. S. K. Menon and Kannan M. Krishnan, " Charge transfer and short range order in Cu-Pd and Ni-Mo alloys", *Phil. Mag Lett*, **66**, 271-275 (1992)
36. Kannan M. Krishnan, E.S. K. Menon, P. Huang, P. Singh and D. de Fontaine, "Short-range order effects on copper L_{3,2} transitions in Cu-Pd alloys", *Appl. Phys. Lett.*, **60**, 1762-1764 (1992).
35. M. C. Salvadori, M. A. Brewer, J. W. Ager III, I.G. Brown and Kannan M. Krishnan, " The effect of a graphite holder on diamond synthesis by microwave plasma chemical vapor deposition", *J. Elec. Chem. Soc.*, **139**, 558-560 (1992).
34. Kannan M. Krishnan, "Ferromagnetic δ -Mn_xGa(1-x) thin films with perpendicular anisotropy", *Appl. Phys. Lett.*, **61**, 2365-2367 (1992).
33. N-H. Cho, Kannan M. Krishnan, C. Lucas and R. F. C. Farrow, " Microstructure and magnetic anisotropy of ultrathin Co/Pt multilayers grown on GaAs by MBE", *J. Appl. Phys.* , **72**, 5799-5807 (1992).
32. N-H. Cho, Kannan M. Krishnan and R.F.C. Farrow, " Twin formation in seeded Co/Pt superlattices grown by MBE", *Applied Physics Letter*, **60**, 2371-2373 (1992).

1991

31. M. C. Salvadori, J. W. Ager III, I.G. Brown and Kannan M. Krishnan, "Diamond synthesis by microwave plasma CVD using graphite as the carbon source", *App. Phys. Lett.*, **59**, 2386-2388 (1991)
30. Kannan M. Krishnan, " Structure of newly synthesized BC₃ films ", *Appl. Phys. Lett.*, **58**, 1857-1859 (1991)

1990

29. N. -H. Cho, Kannan M. Krishnan , D. K. Viers, M. D. Rubin, C. B. Hopper, B. Bushan and D. B. Bogy, "Chemical structure and physical properties of diamond-like carbon films prepared by magnetron sputtering", *J. Mater. Res.* **5**, 2543-2554 (1990).
28. Kannan M. Krishnan, "Channeling and related effects in electron microscopy : the current status", "Fundamental beam interactions with solids for microscopy, microanalysis and lithography", D. Newbury, J. Schou & P. Kruit editors, *Scanning Microscopy*, Supplement **4**, 157-170, (1990).
27. Kannan M. Krishnan, "Electron energy-loss spectroscopy: fundamentals and applications in the characterization of minerals", American Chemical Society Symposium Volume **415**, "Structures and active sites of minerals: optical and non-optical spectroscopic characterization", L. M. Coyne, S. W. S. McKeever and D. F. Blake editors, Chapter 3, 54 (1990).
26. Kannan M. Krishnan, " Fe L₃/L₂ near edge fine structure studies", *Ultramicroscopy* **32**, 309-311 (1990)

1989

25. Kannan M. Krishnan, "Site occupancy/valence measurements using channeling and related effects in microanalysis", *Materials Science and Engineering* **B3**, 397-402 (1989).
24. J. Kouvetakis, T. Sasaki, C. Shen, R. Hagiwara, M. Lerner, Kannan M. Krishnan and N. Bartlett, "Novel aspects of graphite intercalation by fluorine and fluorides and new B/C, C/N and B/C/N materials based on the graphite network.", *Synthetic Metals* **34**, 1-7 (1989).

1988

23. Kannan M. Krishnan, "Channeling Enhanced Microanalysis: a high resolution analytical technique for atomic site and species determination", *Crystal Properties and Preparation*, **16**, 221 (1988)
22. Kannan M. Krishnan, "Atomic site and species determinations using channeling and related effects in Analytical Electron Microscopy," *Ultramicroscopy*, **24**, 125-142 (1988).
21. D. Blake, F. Freund, Kannan M. Krishnan, C.J. Echer et al., "The nature and origin of interstellar diamond", *Nature*, **332**, 611-613 (1988).
20. S. M. Anlage, B. Fultz and Kannan M. Krishnan, "Icosahecral phase formation in rapidly quenched aluminum-ruthenium alloys, *Journ. Mat. Res.*, **3**, 421-425 (1988).

1987

19. Kannan M. Krishnan, "When is parallel illumination best for ALCHEMI ?" *Ultramicroscopy* **23**, 199-203 (1987).
18. J. Turner and Kannan M. Krishnan, "An improved photographic process for convergent beam electron diffraction applications," *Journal of Electron Microscopy Techniques* **5**, 211-215 (1987).
17. R. Kilaas, M. A. O'Keefe and Kannan M. Krishnan, "On the inclusion of upper Laue layers in computational methods in High Resolution Transmission Electron Microscopy", *Ultramicroscopy* **21**, 47-61 (1987).
16. D. Blake, Kannan M. Krishnan, C.J. Echer, D. Ackland and F. Freund, "Analytical microscopy of interstellar diamond", *J. Elec. Mic. Techn.* **7**, 143(1987).
15. Kannan M. Krishnan, "Novel graphites in the BCN system: characterization by EELS", *J. Elec. Mic. Techn.* **7**, 141 (1987).
14. T. Sands, V.G. Keramidas, K.M. Yu, J. Washburn and Kannan M. Krishnan, "A comparative study of the phase stability and film morphology in thin-film M/GaAs systems (M=Co, Rh, In, Ni, Pd and Pt)," *J. Appl. Phys.*, **62**, 2070 (1987)
13. T. Sands, C.C. Chang, V.G. Keramidas, Kannan M. Krishnan and J. Washburn, "The Ni-InP reaction: Formation of Amorphous and Crystalline Ternary Phases," *App. Phys. Lett.* **50**, 1346-1348 (1987).

1986

12. Kannan M. Krishnan, P. Rez, G. Thomas, Y. Yokota and H. Hashimoto, "The combined effect of acceleration voltage and incident beam orientation on the characteristic x-ray production in thin crystals," *Philosophical Magazine* **B53**, 339-348 (1986).
11. R. Ramesh, Kannan M. Krishnan, E. Goo, G. Thomas, M. Okada and M. Homma, "Microstructure of Fe-Didymium-B magnets", *J. Mag. Mag. Mat.*, **54-57**, 563 (1986)
10. D.A. Ackland, U. Dahmen, R. Kilaas, Kannan M. Krishnan, C. Nelson, M.A. O'Keefe, W. Smith and J. Turner, "Recent transmission electron microscopy applications at NCEM," *Journal of Metals* **38**, 19-24 (1986).
9. Kannan M. Krishnan, R. Gronsky and L. E. Tanner, "Determination of the composition of the icosahedral phase in rapidly solidified Al-Mn quasi-crystals at high spatial resolution," *Scripta Metallurgica* **20**, 239-242 (1986).

1985

8. R. Gronsky, Kannan Krishnan and L.E. Tanner, "Structural regularity and imperfections in the icosahedral phase of the Al-Mn system", *JOM- J. Min. Met. Mat.* **37** (8): A74-A74 (1985)
7. Kannan M. Krishnan, P. Rez and G. Thomas, "Crystallographic site occupancy refinements in thin film oxides by channeling enhanced microanalysis," *Acta Crystallographica* **B41**, 396-405 (1985).

1984

6. Kannan M. Krishnan, L. Rabenberg, R.K. Mishra and G. Thomas, "Site occupation of ternary elements in $\text{Sm}_2(\text{Co, TM})_{17}$ compounds," *Journal of Applied Physics* **55**, 2058-2060 (1984)
5. T. R. Dinger, Kannan M. Krishnan, G. Thomas, M. I. Osendi and J. S. Moya, "Investigation of ZrO_2 /Mullite solid solution by energy dispersive x-ray spectroscopy and electron diffraction," *Acta Metallurgica* **32**, 1601-1607 (1984).
4. Kannan M. Krishnan and G. Thomas, "A generalization of atom location by channelling enhanced microanalysis," *Journal of Microscopy* **136**, 97-101(1984).

1981

3. F.F. Y. Wang, Kannan M. Krishnan, D.E. Cox and A.M. Reynolds, "Compositional and structural studies of a MnZn Ferrite under different processing conditions", *J Appl. Phys.* **52** (3): 2436-2438 (1981)

1980

2. Kannan M. Krishnan, F.F.Y. Wang, A.M. Reynolds, "Effect of heat treatment on MnZn Ferrite", *Amer. Cer. Soc. Bull.*, **59** (3): 379-379 (1980)

1979

1. F. F. Y. Wang, S. Bhaduri, T. A. Baum and Kannan M. Krishnan, " Hot pressing of silicon," in *Sintering Processes*, G. C. Kuczynski (ed.), *Materials Science Research* **13**, 289-94 (1979)

Publications in Refereed Conference proceedings (not updated after 2002)

60. Michael Beerman, Masato Ohnuma, Yuping Bao, Kannan M. Krishnan, "Structure of Cobalt Nanosphere Superlattice Films by Small Angle X-ray Scattering", Proc. of the 2004 Spring Materials Research Society Symposium (M)
59. Kannan Krishnan, "Magnetism and microstructure: a spin through two decades of research at Berkeley", Proc. of the 15th International Congress of Electron Microscopy, p143 (2002).
58. Kannan Krishnan, G. Kusinski, W. Grogger, M. E. Gomez and E. Girt, "Magnetic behavior of nanocrystals, superlattices and lithographic arrays", Proc. of the 15th International Congress of Electron Microscopy, p283 (2002).
57. G. Kusinski, Kannan Krishnan, and G. Thomas, "Structure of magnetic Co/Pt multilayers", Proc. of the 15th International Congress of Electron Microscopy, p137 (2002).
56. W. Grogger, N. Cheng and Kannan M. Krishnan, "Roughness measurements on thin magnetic layers using energy-filtering TEM", Proc. Of Microscop. and Microanalysis (2002)
55. Werner Grogger, Maria Varela del Arco, Kannan Krishnan, " Energy-filtered imaging and growth mechanism of YBa₂Cu₃O_{7-d} ultrathin films" Proc. Int. Conf. Of Microbeam. Anal. Soc. (2000)
54. G. J. Kusinski, D. Weller, B. D. Terris, L. Folks, A. J. Kellock, C. Rettner, J. E. E. Baglin, M. E. Best, Kannan Krishnan and G. Thomas, " In-situ LTEM investigations of switching of the magnetic patterns prepared by ion-beam irradiation", MRS Conf. Proc. Spring 2000 (submitted)
53. Er. Girt, Kannan M. Krishnan, G. Thomas and Z. Althunian, "Nd-rich Fe-Nd-B alloys tailored for maximum coercivity", MRS Conf. Proc. Spring [1999]
52. Kannan M. Krishnan, Er. Girt, E.C. Nelson, G. Thomas and F. Hofer, " Microstructure of Fe-Nd-B alloys tailored to approach theoretical coercivity limits", Microscopy and Microanalysis, **5**, sup2, 26 (1999)
51. V. Radmilovic and Kannan M. Krishnan, "Magnetic domain wall-microstructure interactions in low-carbon steels" , Microscopy and Microanalysis, **5**, sup2, 18 (1999)
50. Kannan M. Krishnan, "Magnetism and microstructure: advances in electron-optical characterization", Microscopy and Microanalysis, **5**, sup2, 24 (1999)
49. E. Arenholz, B. S. Mun, A. W. Kay, Kannan M. Krishnan, H. L. Ju and C. S. Fadley, "Electronic and geometric structure of LSMO studied by XPS and XPD", Proc. Int. Conf. VUV Spect. in press
48. Kannan M. Krishnan and T. Sands, Preface to the special section on "Coupled property issues in integrated microstructures", *Acta Mater.* **46** (11): 3715-3715 JUL 1 1998
47. Kannan M. Krishnan, "Magnetic Thin Films and Nanostructures in Emerging Technologies", Proc. XV Physical Metallurgy and Materials Science Conf. on Advanced Materials & Technologies, edited by J. Kusinski, pp 775 (1998).
46. K. Verbist, E.C. Nelson, T.C. Anthony, J. A. Brug and Kannan M. Krishnan, Lorentz transmission electron microscopy in a standard CM200FEG, Proc. ICEM 14, 503 (1998)
45. D. Blake, A. Treiman, S. Cady, C. Nelson and Kannan M. Krishnan, Lunar and Planetary Science Conference Proceedings, XXIX, 1347 (1998)
44. K. Verbist, C. Nelson, K. Krishnan, "User access to Lorentz microscopy at THE NCEM, LBNL, Berkeley", *Microscopy and Microanalysis*, **4**, suppl 2, 472 (1998).
43. Kannan M. Krishnan, Honglyoul Ju and C. Nelson, "Electronic structure and conductivity mechanism in manganite thin films exhibiting colossal magnetoresistance" , *Microscopy and Microanalysis*, **4**, suppl 2, 620 (1998).
42. Mohamed Benaissa , Kannan M. Krishnan and Eric E. Fullerton, High in-plane anisotropy SmCo sputtered thin films, Proc. ICEM 14, 519 (1998)
41. Kannan M. Krishnan, Quantitative electron microscopy of magnetic thin films, Proc. ICEM 14,505 (1998)
40. Mohamed Benaissa , Kannan M. Krishnan and V. Panchanathan, "Microstructural characteristics of rapidly quenched Nd₂Fe₁₄B/a-Fe exchange-spring magnets" , Proc. ICEM 14, 533 (1998)

39. Tai D. Nguyen and Kannan M. Krishnan, "Magnetic Domain Imaging of Rapidly-Quenched NdFeB-Based Hard Magnet Alloys by Lorentz Microscopy in the ARM", Proc. ICEM 14, 551 (1998)
38. Hyunchul Sohn, Kannan M. Krishnan and Richard Fink, "Microstructures of Amorphic DiamondTM films grown by laser ablation method", MRS Meeting Proceedings (in press).
37. Kannan M. Krishnan, A. R. Modak, H. Ju and P. Bandaru, "Synthesis, tailored microstructures and CMR in oxide thin films", *Ceramic Microstructures '96: Control at the atomic level*, A. Glaeser and A. Tomsia editors, pp597 (1998)
36. Kannan M. Krishnan and H. L. Ju, "New insights on the nature of charge carriers and colossal magnetoresistance in manganite thin films", Proc. Int. Colloq. Mag. Films and Surfaces'97, p320, 1997
35. M. A. Brewer and Kannan M. Krishnan, "Microstructure and spin-orbit resolved measurements of the magnetic moment in Fe₁₆N₂ films grown on Si(001)", Proc. Int. Colloq. Mag. Films and Surfaces, p 22, 1997
34. Kannan M. Krishnan, H. L. Ju, H. -C. Sohn, C. Nelson and A. R. Modak, "New insights into the transport and field-enhancement effects in sol-gel derived colossal magnetoresistive thin films", Spring '97 MRS Symposium on Epitaxial Oxide Thin Films, (1997)
33. T. R. C. Fernandes, C. J. Echer and Kannan M. Krishnan, "Contrasting cation distributions in spinels of similar composition", Proc. MSA, Microscopy and Microanalysis, **3**, supp 2, 757 (1997)
32. Kannan M. Krishnan, "Microstructure and micromagnetics in thin film and multilayer materials for emerging technologies", Proc. Mexican Electron Microscopy Society & Materials Research Society, Cancun (1996)
31. F. M. Ross, Kannan M. Krishnan et al, "Applications of electron microscopy in collaborative industrial research", MRS Bulletin, **XXI**, 17 (1996).
30. Kannan M. Krishnan & A. R. Modak, "Epitaxy and magnetotransport properties of La_{1-x}Sr_xMnO₃ (x=0.2-0.3) films synthesized by both pulsed laser deposition and novel chemical routes", MRS Symposium Proceedings, **401**, 443 (1996)
29. Kannan M. Krishnan, M. A. Brewer, T. Kobayashi, A. Nakanishi and A. Young, NATO/ASI on "Magnetic hysteresis in novel magnetic materials", edited by G. Hadjipanayis, 561 (1996)
28. Kannan M. Krishnan, "Magnetism on a microscopic scale", MRS Bulletin Special issue, October (1995)
27. Kannan M. Krishnan, "High voltage and high resolution electron microscopy investigations of materials", Proc. Osaka University Symposium on "New Generation of HVEM", p6 (1995)
26. N. Thangaraj, Kannan M. Krishnan and R. F. C. Farrow, "Characterization of granular and multilayer magnetic thin films by HREM", Proc. Mexican Electron Microscopy Society (1994)
25. R. F. Marks, G. Harp, S. S. P. Parkin, R. F. C. Farrow, T. Rabedeau, M. Toney, A. Cebollada, N. Thangaraj and Kannan M. Krishnan, "Giant magnetoresistance and structure of phase-segregated epitaxial metals", MRS Symposium on Magnetic Ultrathin Films, Surfaces and Interfaces, **313**, 411 (1993).
24. Kannan M. Krishnan, "Magnetic Thin Films and Nanostructures: Anisotropy, microstructure and their inter-relationship", in "Microstructure of Materials" edited by Kannan M. Krishnan, SF Press 70 (1993)
23. Kannan M. Krishnan, "Electronic structure changes associated with magnetic transitions in binary alloys: an exploratory PEELS study", Proc EMSA, **50**, 1260 (1992).
22. Kannan M. Krishnan, "Ceramic microstructures and their elucidation by imaging, diffraction and spectroscopic methods", Proc X EUREM, 363 (1992).
21. Kannan M. Krishnan and C. J. Echer, "Measurement of ionization cross-sections for electron energy-loss microanalysis under well defined scattering conditions", Proc. MAS, 259 (1991).
20. E. S. K. Menon, Kannan M. Krishnan, P. Huang, C. J. Echer, P. Singh and D. de Fontaine, "Electronic structure of Cu-Pd alloys", Proc. XII ICEM, **4**, 38 (1990)
19. Kannan M. Krishnan, "Crystallographic effects in X-ray microanalysis", Proc. XII ICEM, **2**, 466 (1990).

18. N. -H. Cho, Kannan. M. Krishnan, D. K. Viers, M. D. Rubin, B. Bushan and D. B. Bogy, " Power density effects in the physical and chemical properties of diamond-like carbon thin films", MRS Symposium on "Materials issues in microcrystalline semiconductors", **164**, 309 (1990).
17. N. -H. Cho, Kannan M. Krishnan and D. B. Bogy, "Chemical structure of diamond-like carbon thin films", Proc. XII ICEM, **4**, 710 (1990).
16. Kannan M. Krishnan, " Microanalytical and structural characterization of optical materials by electron microscopy and related spectroscopies" , MRS Symposium on "Optical Materials: Processing and Science" , **152**, 151 (1989).
15. Kannan M. Krishnan, J. Kouvetakis, T. Sasaki and N. Bartlett, "Synthesis and characterization of novel graphite films", MRS Symposium on "Better ceramics through chemistry", **121**, 527 (1988)
14. Kannan M. Krishnan and M. Stampfer, "Background modeling alternatives in EELS and their implications on microanalysis", Proc. EMSA **46**, 538 (1988)
13. Kannan M. Krishnan, D.F. Blake, F. Freund and R.J. Lipari, "Structure and bonding of diamond and diamond-like materials: characterization at high spatial resolution", Materials Research Society Symposium on "Diamond and diamond-like material synthesis", **77** (1988).
12. J.W. McCauley, Kannan M. Krishnan, R.S. Rai, G. Thomas, A. Zangvill, R.W. Doser and N.D. Corbin, "Anion controlled microstructures in the AlN and Al₂O₃ systems," Ceramic Microstructures, Berkeley, ed. J. Pask, **577** (1988).
11. Kannan M. Krishnan, "Study of novel graphite-like materials in the B-C-N system by electron energy loss spectroscopy" , Analytical Electron Microscopy, ed. D.C. Joy, San Francisco Press, **261** (1987).
10. Kannan M. Krishnan and G. Thomas, "Microanalysis of polytypoid ceramics by imaging, diffraction and spectroscopy," Microbeam Analysis-1987, ed. R.H. Geiss, San Francisco Press, **222** (1987).
9. D. Blake, F. Freund, T. Bunch, Kannan M. Krishnan, A. Tielens, M. Stampfer and S. Chang, "Nature and origin of interstellar diamond from Allende", NASA Ames Symposium on "Carbon in the Galaxy: Studies from Earth and Space", **28** (1987).
8. Kannan M. Krishnan and C.J. Echer, "Determination of UTW k-factors for low Z microanalysis: a systematic approach" , Analytical Electron Microscopy, ed. D.C. Joy , S.F. Press, **99** (1987).
7. D. Blake, Kannan M. Krishnan, C.J. Echer, F. Freund, R. Shipp, D. Ackland, T.E. Bunch, J. Flons and S. Chang, "Analytical electron microscopy of interstellar diamond from Allende", Proc. of the 50th Ann. Meeting of the Meteoritical Society, Newcastle upon Tyne , Meteoritics **22** (4): 329-330 Dec 31 (1987).
6. Kannan M. Krishnan, T. Sands and R. S. Caron, "Early stages of the M-InP (M-Ni,Pd) reaction: solid state amorphization and subsequent crystallization", EMSA Proc. **45**, 330 (1987).
5. Kannan M. Krishnan, R. S. Rai, G. Thomas, N. D. Corbin and J. W. McCauley, "Characterization of long period polytypoid structures in the Al₂O₃-AlN system by CBED and phase contrast microscopy," Materials Research Society Symposium, Boston, MA, Proceedings on Defect Properties and Processing of High-Technology Nonmetallic Materials **60**, 211-218 (1986)
4. R. Gronsky, Kannan M. Krishnan and L. E. Tanner, "An electron microscopy study of the icosahedral phase in the aluminium-manganese system," Electron Microscopy Society of America, Proceedings **43**, 34-35 (1985).
3. Kannan M. Krishnan, G. Thomas, Y. Yokota and H. Hashimoto, "Voltage and orientation dependence of characteristic x-ray production in thin crystals," Electron Microscopy Society of America, Proceedings **43**, 414-415 (1985).
2. Kannan M. Krishnan, P. Rez, R.K. Mishra and G. Thomas, "Determination of specific site occupation of rare earth additions in Y_{1.7}Sm_{0.6}Lu_{0.7}Fe₅O₁₂ thin films by the orientation dependence of characteristic x-ray emissions," Materials Research Society Symposium, Boston, MA, Proceedings on the Electron Microscopy of Materials **31**, 79-84 (1984)
1. Kannan M, Krishnan, P. Rez and G. Thomas, "Effect of voltage on the orientation dependence of electron-induced characteristic x-ray emissions," Proceedings of the VII International Conference

on High Voltage Electron Microscopy, R. Fisher, R. Gronsky and K. H. Westmacott (eds.), 365-70 (1983).

Edited Books and Issues

1. "Magnetic Ultrathin Films: Multilayers and Surfaces & Interfaces and Characterization ", Kannan M. Krishnan co-editor, MRS Symposium proceedings, vol 313, (1993)
2. "Microstructure of Materials", edited by Kannan M. Krishnan, San Francisco Press (1993)
3. "Quantitative Electron Microscopy", edited by U. Dahmen and Kannan M. Krishnan, Report of a Workshop held at Berkley in August, 1992 (Lawrence Berkeley Laboratory, Special publication, (1993).
4. "Magnetism on a microscopic scale", Kannan M. Krishnan, Guest Editor, MRS Bulletin, October [1995]
5. "Coupled property issues in integrated microstructures", Special Issue of Acta Materialia, **46**(11) (1993)