Curriculum vitae

Thomas Vogt
Educational Foundation Distinguished Professor
Department of Chemistry & Biochemistry
University of South Carolina
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https://en.wikipedia.org/wiki/Thomas_Vogt

Education

May 1985	Chemistry studies and Diploma at the Eberhard-Karls Universität in Tübingen/Germany. Diploma Thesis:"Synthesis, Properties and Structures of Oligomer and Polymeric complexes of Iron, Molybdenum and Tungsten with Telluro-Phenol Ligands."
Sept 1985 – Aug 1986	Experimental part of Doctoral Thesis at the Laboratoire de Chimie de Coordination in Toulouse/France and at Laboratoire pour l'Utilisation du Rayonnement Electromagnetique (LURE) in Paris/France.
Feb 1987	Ph.D. Thesis at the Eberhard-Karls Universität in Tübingen/Germany. "Large-Angle X-ray Scattering and EXAFS Investigations of Metallorganic Polymers"

Appointments

May 1982- May 1983	Research student at IBM Research Center in San Jose, California. Work on synthesis of perfluororalkylether polymers.
Mar –Dec 1987	Postdoctoral appointment with Prof. Hartmut Fuess in Frankfurt/Germany. Synchrotron and neutron diffraction at HASYLAB (DESY Hamburg,Germany) and the Institute Laue-Langevin (Grenoble, France)
Jan 1988 - July 1992	Scientist at the Institute Laue-Langevin, France. Work in crystallography, neutron optics, x-ray and neutron scattering, solid state chemistry. Supervision of three post-doctoral fellows.
Aug 1992 – Oct 1995	Associate physicist at Brookhaven National Laboratory (BNL). Responsible for construction and operation of a new high-resolution neutron powder diffractometer (H1A) at the HFBR.
Oct 1995	Promotion to physicist at BNL. Responsible for neutron powder diffraction at the High Flux Beam Reactor at BNL. Head of Participating Research Team involving industry (DuPont, UOP, Air Products, Biosym, IBM) and academia (UCSB, Oregon State, SUNYSB, Ames). Work in x-ray powder diffraction at beam line X7a at the NSLS.

Jan 2000	Promotion to group leader of the Powder Diffraction Group in the Physics Department at BNL. Responsible for high-resolution synchrotron x-ray scattering beam line X7A at NSLS.
Jan 2003 - Sep 2005	Head of Materials Synthesis & Characterization Group in the BNL Physics Department, Cluster Leader of Materials Synthesis in the Center for Functional Nanomaterials (CFN) and Technical Coordinator for scientific equipment in the CFN building project at BNL.
Since April 2004	Adjunct Professor in the Department of Philosophy at the University of South Carolina
October 2005- October 2023	Director of the NanoCenter and tenured full professor in the Department of Chemistry and Biochemistry at the University of South Carolina
Aug 2009-Aug 2013	Visiting Professor at the African University of Science and Technology In Abuja, Nigeria, Teaching undergraduate chemistry.
Since November 2009	Educational Foundation Distinguished Professor, University of South Carolina, reappointed in 2015 and 2020
Oct 2011-Sept 2013	Associate Vice President for Research

Qualifications and Scientific Focus

- Extensive knowledge of nanoscience, crystallography, materials chemistry and chemical synthesis as well as technical expertise in diffraction and imaging techniques and instrumentation using x-rays, neutrons and electrons.
- Author of more than 350 publications in peer reviewed scientific journals and topical
- Google Scholar H-index: 70[top 3% worldwide; over 22,600 total citations[top 3% worldwide ; 6 major review articles.
- https://scholar.google.com/citations?user=TV5fyfgAAAAJ&hl=en
  3 books as editor, co-author of the text book 'Solid State Materials Chemistry'(Cambridge University Press) and 1 book in preparation with Oxford University Press)
- 11 U.S. patents (#6,238,823, #6,613,213, #7,074,386, #8,168,086, #8,168,085, #8.236,569, #8,252,598, #8,475,681, #8,673,180, #9,587,174, #9,856,419)

Significant Awards

- 2019 Educational Foundation Award in Science, Mathematics and Engineering
- 2018 Carolina Trustee Professorship at the University of South Carolina
- 2018 Fellow of the Neutron Scattering Society of America
- 2018 Fellow at the Institute of Advanced Study, Durham University, UK

- 2009 International Visiting Research Fellowship at the University of Sydney, Australia
- 2008 Fellow of the American Association for the Advancement of Science.
- 2006 Fellow of the American Physical Society
- 2002 Design and Engineering Award of Popular Mechanics
- 1996 R&D 100 award from R&D Magazine

Scientific Highlights and Main Collaborations

- Pressure-induced hydration, insertion and confinement of water in zeolites under hydrostatic pressures, diffraction using free electron lasers [with Yongjee Lee (Yonsei University, Korea)]
- Materials with negative thermal expansion, R&D 100 award 1996 [A.W. Sleight, Oregon State, J.S.O. Evans Durham, UK]
- High-pressure studies of alloys and oxides [J.A. Hriljac (U. of Birmingham), B. Kennedy (U. Sydney), P.M. Woodward (Ohio State), J. Parise (SUNY Stony Brook)]
- Hydrogen storage systems and battery related materials; 2002 work awarded a Design and Engineering Award of Popular Mechanics [J. Reilly, J. McBreen (BNL)]
- Spin and charge order in complex oxides [P.M. Woodward (Ohio State), P. Karen (Oslo), A.K. Cheetham (UCSB), B. Kennedy (Sydney))]
- Crystallography and aberration-corrected scanning transmission electron microscopy of oxide catalysts [Doug Blom (USC), Doug Buttrey (Delaware), W. Dahmen (RWTH Aachen). P Binev (USC-Columbia), Nigel Browning (Liverpool (UK))]]
- Global Research Laboratory funded by Korean Ministry of Science, Education and Technology on "Novel Nanotechnology on Pressure-induced Auxetic Materials". Partner Organizations: Stanford University (Dr. Chi-Chang Kao) and Yonsei University (Dr. Yongjae Lee).

Significant Scientific Impact

- Structural determination of the seven-coordinated molecules IF_7 and ReF_7 using high-resolution neutron powder diffraction. (**T. Vogt**, AN Fitch, JK Cockroft Science 263, 1265 (1994))
- Localization of hydrogen in zeolite Y (M. Czjzek, H. Jobic, AN Fitch, **T. Vogt** J. Phys. Chem. 96, 1535 (1992))
- Materials with negative thermal expansion. (T.A. Mary, J.S.O. Evans, **T. Vogt**, A.W. Sleight Science 272, 90-92 (1996))
- Temperature and pressure-driven spin state transitions in cobaltates (**T. Vogt**, PM Woodward, P. Karen, BA Hunter, P. Henning, AR Moodenbaugh Phys. Rev. Lett. 84, 2969 (2000))
- High-dielectric-constant perovskite-related $CaCu_3Ti_4O_{12}$. (Homes, C.C., **Vogt, T.,** Shapiro, S.M., Wakimoto, S., and Ramirez, A.P. Science 293, 673-676 (2001) and A.P. Ramirez, M.A. Subramanian, M. Gardel, G. Blumberg, D. Li, **T. Vogt**, S.M. Shapiro Solid State Comm. 115, 217-220 (2000))
- First structure of a super-hydrated zeolite. (Y. Lee, J.A. Hriljac, **T. Vogt**, J.B. Parise, and G. Artioli J. Am. Chem. Soc. 123, 12732-12733 (2001))
- Pressure-induced hydration in zeolites. (Yongjae Lee, **Thomas Vogt**, Joseph A. Hriljac, John B. Parise, Jonathan C. Hanson, and Sun Jin Kim Nature 420, 485-489 (2002))

- Quantitative High-Angle Annular Dark Field Scanning Transmission Electron Microscopy of complex Oxides.
  William D. Pyrz, Douglas A. Blom. **T. Vogt**, D.J. Buttrey Angewandte Chemie Int. Ed., 47, 2788-2791 (2008).
- "Irreversible Xenon Insertion into a Small Pore Zeolite at Moderate Pressure and Temperatures." Donghoon Seoung, Hyunchae Cynn, Changyong Park, Kwang-Yong Choi, Douglas A. Blom, William J. Evans, Chi-Chang Kao, **Thomas Vogt**, Yongjae Lee, Nature Chemistry 6(9), 835-839 (2014)
- "A role for subducted super-hydrated kaolinite in the Earth's deep water cycle."
  Huijeong Hwang, Donghoon Seoung, Yongjae Lee, Zhenxian Liu, Hanns-Peter Liermann, Hyunchae Cynn, **Thomas Vogt**, Chi-Chang Kao, Ho-Kwang Mao
  Nature Geoscience, **2017**, Vol 10, 947-953
- "Pressure-Driven Phase Transitions and Reduction of Dimensionality in 2-D Silicon Nanosheets" Gil Chan Hwang, Douglas A. Blom, **Thomas Vogt**, Jaejun Lee, Heon-JinChoi, Sen Shao, Yanming Ma, Yongjae Lee. Nature Commun. **2018**, 9(1), 5412
- "Sub-nanosecond phase transition dynamics in laser-shocked iron."
  Huijeong Hwang, Eric Galtier, Hyunchae Cynn, Intae Eom, Sae Hwan Chun, Yoonah Bang, Jinhyuk Choi, Taehyun Kim, Mihye Kong, Soyeon Kwon, Gilchan Hwang, Hae Ja Lee, Chang-Kun Park, Jong-Ik Lee, Yongmoon Lee, Wenge Yang, Sang-Heon Dan Shim, **Thomas Vogt**, Sangsoo Kim, Jaeku Park, Sunam Kim, Daewoong Nam, Jae Hyuk Lee, Hyojung Hyun, Tae-Yeong Koo, Ki Bong Lee, In Soo Ko, Chi-Chang Kao, Toshimori Sekine, and Yongjae Lee Science Advances, **2020**, Vol 6(23), eaaz5132
- "Probing compositional order in atomic columns – STEM simulations beyond the virtual crystal approximation." Douglas A. Blom, **Thomas Vogt**. Microscopy and Microanalysis, **2020**, Vol 26(1), 46-52

Advances in Instrumentation and Measurement Techniques

- High temperature neutron single crystal and powder diffraction experiments at 2000K
- Design and construction of a new wafer-based high-resolution monochromator for neutron scattering.
- Measurement device for neutron diffraction of thin films avoiding preferred orientation.
- High-pressure/low-temperature powder diffraction using synchrotron and neutron radiation.
- Shielding of high resolution electron microscopes and electromagnetic pulse facilities.
- STEM simulations beyond the virtual crystal approximation.

Selected Talks and Public Appearances

- Invited by the International Atomic Energy Commission (IAEA) to lecture at the 1993 IAEA Regional Training Course on Nuclear Methods in Materials Development in Beijing, China, August 1993

- Distinguished speaker at the annual meeting of the Norwegian Physical Society, Oslo, July 1994 "High-Resolution Neutron Powder Diffraction"
- Workshop on Composite Germanium Monochromators, Alp Sellamatt, Switzerland, June 11-13, 1995"The development of wafer stacked composite monochromators at BNL."
- Workshop on Neutron Instrumentation in Les Houches, France, 1995 "Wafer-based germanium monochromators for high-resolution neutron powder diffraction."
- International Union of Crystallography Congress in Seattle Washington, August 1996 "High Resolution Neutron Powder Diffraction at BNL."
- Meeting of the Electrochemical Society, Toronto, 1997 "Non-stoichiometric AB_{5+x} electrodes for NiMH batteries."
- Australian Physical Society Meeting in Wagga Wagga, February 1998 "Negative Thermal Expansion."
- International Conference on Rare Earths in Fremantle, Australia, October 1998 "Non-stoichiometric AB_5 Type Alloys and their properties as Metal Hydride Electrodes."
- American Chemical Society Meeting in Boston, August 2002 "Charge- and spin-order in mixed valence iron and cobalt double perovskites."
- Catalysis Club of Chicago, February 2003 "Towards a High Pressure Chemistry of Zeolites."
- Workshop on Strongly Correlated Electronic Materials, Princeton University, January 27&28, 2005
- Speaker at Tradeline Conference Series "Research Buildings 2005" April 19-19, 2005 in St. Petersburg, Florida
- Speaker at the 2005 National Science Foundation Workshop on Inorganic Chemistry
- Invited talk at the Department of Energy's Workshop on "Dealing with Societal Implications of DOE Science." May 1-2,2006
- Panelist on the PBS series "The Power of Small", broadcasted in April 2008
- Panelist on TV program Carolina Business Review with Chris Williams March & June 2008, June 2009
- Invited plenary talk at the inaugural meeting of the Society for the Study of Nanoscience and Emerging Technologies in Seattle, Washington, September 8-11, 2009
- Invited talk "HRTEM imaging of Complex Oxides" at Pacific Chem, Honolulu Hawaii December 15-20, 2011
- Invited participant of the National Academies Keck Futures Initiative "Seeing the future with imaging science" November 16-19, 2011, secured seed grant in April 2011.
- Invited talk at Stanford Synchrotron Radiation Laboratory "Scanning Transmission Electron Microscopy Investigations of Complex Oxides" May 16th 2011
- Invited talk at the Phosphor Global Summit 2011 March 22-24, 2011 in San Antonio
- Invited talk "Imaging at the Nanoscale" at 2nd NanoWorcester Symposium, March 17, 2012 , Worcester, Massachusetts
- Invited attendee for 'Workshop on Second Guide Hall at OPAL', Australian Nuclear Science Organization, April 16-18, 2012, Sydney Australia
- Invited talks in Israel at Weizmann Institute (Dec 3, 2012) and the Technion (Dec 6 , 2012)
- Invited talk "Imaging at the Edge" at the Center for Interdisciplinary Research (ZiF) Bielefeld, March 15, 2013 during International conference on "Dimensions of Measurements".
- Invited talk "Pressure-induced trapping of radionuclides in zeolite: combined diamond anvil cell and large volume pressure experiments" at study of Matter at Extreme Conditions, Miami March 23-30, 2013
- Invited talk "Exploring Chemical and Structural Parameter Space" at Advances in Structural and Chemical Imaging (ASCI 2013), Eugene Oregon May 29-30, 2013

- Invited talk “Oxyfluoride Phosphors” at symposium "Luminescence and Display Materials: Fundamentals and Applications" at the Electrochemical Society Meeting in San Francisco, October 27- Nov 1, 2013
- Invited talk “Pressure Induced Insertions in Zeolites”, November 1, 2013, University of Nevada, Las Vegas
- Invited talk Catalysis Research Center TU Munich “Pressure Induced Insertion in Zeolites”, December 4, 2013
- Panel member at Globes Conference December 2013, Tel Aviv, Israel
- Invited talks at the Australian Nuclear Science and Technology Organization in Sydney, Australia: (1) “Real Space Imaging of Complex Materials” January 22, 2015 & “Hydration and Insertion of Chemical Species under Pressure” March 12, 2015
- Invited talks “Hydration and Insertion under Pressure” University of Sydney March 27, 2015 & Macquarie University April 10th, 2015 & Yonsei University July 7th, 2015
- Invited talk “Imaging in Materials Science – Status and Needs” Advanced Structural and Chemical Imaging (ASCI) meeting at Washington State University May 21st, 2015
- Invited talk “Towards a Philosophy of Materials Science” at the Institute for History and Philosophy of Science and Technology (IHPST), University of Paris 1-ENS May 25th 2015
- Invited talk at Advanced Structural and Chemical Imaging (ASCI) meeting at University of Boise, Idaho, May 18-20, 2016
- Invited talk “Emergence and Pathology of Concepts in Materials Science” at the Philosophy Department of the TU Darmstadt, July 4th, 2016
- Invited plenary talk at the 4th Aachen Conference on Computational Engineering Science July 27th, 2017 at RWTH Aachen University, Germany
- Invited talk at Mathematical Advances in Electron Microscopy in Casa Matematica Oaxaca, Mexico, October 15-20, 2017
- Invited public talk at the Institute of Advanced Studies at Durham University “Why we seek structure at the atomic level” 15th of February 2018
- Invited lecture in Workshop “Structure and Explanation in the Sciences” March 22 – 23, 2018 at the Institute for Advanced Studies at Durham University
- Invited colloquium in the Philosophy Department at Trinity University College, Dublin, Ireland February 28, 2019 “What does chemistry bring to the table? – A sketch of a philosophy of chemistry.”
- Invited talk at the Advanced Microscopy Laboratory at Trinity University College, Dublin. Ireland, February 29th, 2019 “STEM investigations of highly complex oxides”.
- Invited plenary talk in DFG/FWF conference “Epistemology of the Large Hadron Collider - Simplicities and Complexities”, University of Bonn, May 22-24, 2019 “Simplicities and complexities in chemistry – the language of vague ideas”.
- Invited talk in the workshop on “Nonlinear Approximations” at the University of South Carolina, October 26th, 2019 “Imaging with Electrons”.
- Invited talk on “Rezepte und Elemente - chemische Zubereitung” in the Ringvorlesung “Komposition” at the Technische Universitat Darmstadt on May 25, 2022

Main Collaborators

D.J. Buttrey (University of Delaware) Structure of complex oxides and ammoxidation catalysts

D. A Blom (University of South Carolina) Aberration-corrected DF and BF STEM imaging
C. Homes (BNL Physics) Materials with giant dielectric response.
J.A. Hriljac (University of Birmingham, UK) High-pressure crystallography
B. Kennedy (University of Sydney) Structure of complex oxides at high pressures using neutrons
Yonjae Lee (Yonsei University) Pressure-induced insertion in Microporous Materials and diffraction using free electron lasers.
Valery Petkov (Central Michigan University) PDF analysis, nanocrystallography
Jim Reilly (BNL) Hydrogen storage systems, battery related materials
JSO Evana (Durham University) Materials with Negative Thermal Expansion
P.M. Woodward (Ohio State University) Charge and Spin Order in Complex Oxides
Chi-Chang Kao (Stanford University) Auxetic Nanomaterials at High Pressures
Wolfgang Dahmen (University of South Carolina) Mathematical Techniques in Image Analysis

Thesis Advisor and Postgraduate-Scholar Sponsor

- **Ph.D. Students (4)**: Zoran Mursic (Intel); Mirijam Czjzek (Universite de Marseilles, France), Sonali Mitra (Air Liquide), Robert Green (Alabama State University)

- **Postdoctoral Scholars Sponsored (3)**: Sangmoon Park (Busan University ,Korea) Yongjae Lee (Yonsei University, Korea), Eirin Sullivan (University of North Florida)

Selected Other Professional Activities and Service

- Membership in the American Chemical Society, American Physical Society, American Association for the Advancement of Science, Materials Research Society.
- Adjunct Professor in the Department of Philosophy at the University of South Carolina. Research in science and technology studies; focus on the societal implications of nanotechnologies and philosophy of science.
- Past Member of the International Advisory Team for the Neutron Powder Diffraction at the Replacement Research Reactor Project at the Australian Nuclear Science & Technology Organization in Sydney, Australia. Reviewer of neutron scattering proposals for ANSTO.
- Past Head of the Industrial Advisory Board for the Department of Materials Science & Engineering at the State University of New York Stony Brook (2003-2005)
- Past Member of the Technical Advisory Board for IMAGO (2003 – 2008)
- Past Organizer of the Materials Research Society Symposium “Materials for Hydrogen Storage” (2004)
- Member of Program Advisory Committee and co-editor of foresight report based on NMI3-sponsored workshop on “Neutrons, Earth Sciences and Environment” Vienna Spring in 2005
- Program Committee for SPIE symposium “Buildings for Nanoscale Research and Beyond” 31 July – 4 August 2005 San Diego, CA
- Chief Technology Officer of three startups: Nanosource, LLC, LUMINOF, LLC and Sens4, LLC
- Member of the Science Review Committee (SRC) for proposals submitted to the Oak Ridge National Laboratory’s (ORNL) neutron scattering facilities 2010-2013; Chair of the subcommittee on “Single Crystal Diffraction” in 2011

- ORAU (Oak Ridge Associated Universities) institutional representative for the University of South Carolina 2012-2013
- Invited expert at the international work shop on "The Second Guide Hall - Next Phase of Expansion at the OPAL Reactor Program. 16-18 April 2012, at ANSTO, Sydney, Australia.
- Member of the NSF review team for the site visit of the center for Nanotechnology in Society, University of Santa Barbara, May 7-8, 2012
- April- August 2022 Board Director of joint venture between Fortissemi and Evo International to build up GaN manufacturing facility in China.
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- Co-Organizer of South Eastern Regional Meeting of the ACS (SERMACS 2016) in Columbia, SC
- Co-Organizer of "Modeling and Simulation 8", Columbia, SC 15-17 March 2018.
- Review of Chemistry Department at Clark University, MA November 30 – Dec 2, 2017
- Reviewer on NSF Panel Solid State and Materials Chemistry Oxides/Perovskites Panel 25-26 Feb, 2019, Washington D.C.
- Invited to NSF ChemMatCARS Advanced Crystallography Workshop at Argonne National Laboratory Dec 14-15, 2019
- Founding Member of the Editorial Board for Physical Review Applied as of January 2014-January 2020
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- **Teaching at the University of South Carolina:**
- Undergraduate: Chem 141M Introduction to Chemistry for chemistry majors
- Graduates: Chem719 (Solid State Materials Chemistry using textbook I co-authored.
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- South Carolina Honors College: SCHC 388 History and Philosophy of Chemistry,
- SCHC499 Senior Honors Thesis advisor (mostly philosophy of science subjects)

Service at the University of South Carolina:

- Past member of the Board of Directors of the University of South Carolina Research Foundation March 2008-2012
- Member of Research Equipment Program Committee at the University of South Carolina 2006-2007
- Member of the Research Advisory Council at the University of South Carolina 2007-2008
- Head of Search Committee for Smart State/Endowed Chair of Economic Excellence in Polymer Nanocomposites (2007) at the University of South Carolina
- Initial Principal Investigator of the Smart State Chair/Center of Economic Excellence in Nanoenvironmental Research and Risk Assessment proposal ($3 million state funds matched)
- Member of the Executive Committee of the Interdisciplinary Mathematics Institute, September since 2009
- Member of the Research Advisory Council of the Vice President for Research and Graduate Education at the University of South Carolina 2010-2011
- Technical coordinator for laboratory build out project in Horizon I building at the University of South Carolina (July 2012-January 2016); budget $12 million
- Technical director of high-resolution aberration-corrected scanning transmission electron microscopy facilities at the University of South Carolina (September 2013-2018)
- Technical coordinator and member of the Architect/Engineering Selection Committee and Team for Classroom/Laboratory Redevelopment at the University of South Carolina; budget $47 million as of May 2016

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- Spring 2020 taught new Honors College Course “History and Philosophy of Chemistry”
- January 2019: Co-chair of Search Committee for Provost and Chief Academic Officer at the University of South Carolina- report to President
- Member of the Strategic Priority Work Team for Physical and Virtual Infrastructure at the University of South Carolina in 2020 – report to President.
- Member of the Committee of 9 to mitigate reductions in force of tenured faculty and/or discontinuation of academic programs (May 2020).
- Pearce Faculty Fellow at the South Carolina Honors College at UofSC, 2020-2022
- Member of Rhodes and Fulbright committees since 2015
- Elected Member of the Faculty Budget Committee in the College of Art and Science (Nov 2022
- Search committee member for the National Fellowship Coordinator position in the Honors College Fall 2020
- Member of the review committee for “accelerated /undergraduate to MD Program /BARSC-MD program (February 2022).

Selected grants and funding:

- Co-Pi on Global Research Laboratory grant by Korean Ministry of Science & Technology ($5million/9years since 2009) on “Novel Nanotechnology using Pressure-Induced Auxetic Materials”. (Yonsei University, University of South Carolina & Stanford Synchrotron Research Laboratory).
- PI on National Academies Keck Future Initiative grant proposal on “Smart Imaging at the Nanoscale” (2011- 2013)
- Co-PI on US Army grant W911NF2010318 “Order in Atom Columns-Imaging Beyond the Virtual Crystal Approximation.” $1,999,690 duration: 2 years; Pi: Michael Mathews (Chem. Engineering), Co-PIs: Thomas Vogt (Chem & Chem. Engineering), Douglas A. Blom (Chem. Engineering), Peter Binev (Mathematics)