

Curriculum vitae

Thomas Vogt

Educational Foundation Distinguished Professor

Department of Chemistry & Biochemistry and Director of the NanoCenter

University of South Carolina

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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 Fues in Frankfurt/Germany. Synchrotron and neutron diffraction at HASYLAB (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 project at BNL.
Since April 2004	Adjunct Professor in the Department of Philosophy at the University of South Carolina
Since October 2005	Director of the NanoCenter and Professor in the Department of Chemistry and Biochemistry at the University of South Carolina
Since August 2009	Visiting Professor at the African University of Science and Technology In Abuja, Nigeria
Since November 2009	Educational Foundation Distinguished Professor, University of South Carolina
Oct 2011-Sept 2013	Associate Vice President for Research

Qualifications and Scientific Interests

- 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 290 publications in peer reviewed scientific journals and books.
- H-index: 54 ; 47; over 14,300;10,802 total citations (Google, WOS); 6 major review articles. 2 books as editor and 2 books in preparation (University of Cambridge Press and Routledge)
- 10 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); 4 pending applications and 1 notice of allowance

Significant Awards

- 2018 Fellowship 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 [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 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 (PNNL)]
- 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 $\text{CaCu}_3\text{Ti}_4\text{O}_{12}$. (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))

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

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 Sella, 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 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 & Mcquarie 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

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-insertion in Microporous Materials
Valery Petkov (Central Michigan University) PDF analysis, nanocrystallography
Jim Reilly (BNL) Hydrogen storage systems, battery related materials

A.W. Sleight (Oregon State 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 (RWTH Aachen) Advanced 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 (University of South Carolina), Robert Green (Claflin University)
- **Postdoctoral Scholars Sponsored (3):** Sangmoon Park (Busan University, Korea) Yongjae Lee (now Yonsei University), Eirin Sullivan (now Illinois State University)

Selected Professional Activities

- 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
- 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
- Speaker at Tradeline Conference Series “Research Buildings 2005” April 19-19, 2005 in St. Petersburg, Florida
- 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
- 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 and Head of Center 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
- 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”. (Universities of Yonsei, University of South Carolina & Stanford Synchrotron Research Laboratory).
- Member of the Research Advisory Council of the Vice President for Research and Graduate Education at the University of South Carolina 2010-2011
- 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” since 2011
- PI on National Academies Keck Future Initiative grant proposal on “Smart Imaging at the Nanoscale”(2011- 2013)
- 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
- 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 (since September 2013)
- Founding Member of the Editorial Board for Physical Review Applied as of January 2014
- Organizer of South Eastern Regional Meeting of the ACS (SERMACS 2016) in Columbia, SC
- Technical coordinator and member of the Architect/Engineering Selection Committee for Classroom/Laboratory Redevelopment at the University of South Carolina; budget \$47 million as of May 2016