
Hans M. Christen

Associate Division Director, Novel Materials and Mechanisms, Materials Science and Technology Division, and ORNL Manager, DOE Materials Sciences and Engineering Program, Oak Ridge National Laboratory

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Professional Positions

- 2013-present **Associate Division Director, Novel Materials and Mechanisms, Materials Science and Technology Division, ORNL**
Responsible for the coordination and line management of seven research groups within the Materials Science and Technology Division, with emphasis on materials synthesis, microscopy, structural and functional properties, and materials theory.
Research in the area of oxide heterostructures within the Thin Films and Nanostructures Group.
- 2011-present **ORNL Manager, DOE Materials Science and Engineering Program**
Coordination of all research programs funded by the US Department of Energy, Office of Basic Energy Sciences, Materials Sciences and Engineering Division, and performed at Oak Ridge National Laboratory within the Materials Science and Technology Division, the Chemical Sciences Division, the Center for Nanophase Materials Sciences, and the Spallation Neutron Source.
- 2006-2013 **Distinguished Research Staff and Group Leader, Thin Films and Nanostructures, Materials Science and Technology Division**
Research focusing on the effects of confinement, strain, and interfaces in perovskite structures and superlattices; ferroelectrics, magnetic oxides, and multiferroics.
Responsible for operations and safety of the group's laboratories; programmatic development, mentoring and training;
Contribution to research and user activities within the Center for Nanophase Materials Sciences (CNMS).
- 2000-2006 **Research Staff Member, Condensed Matter Sciences Division, Oak Ridge National Laboratory**
Research focusing on thin films of complex metal-oxides and the development of pulsed-laser deposition techniques (incl. compositional-spread methods, applied superconductivity research). Involved in the planning of the CNMS laboratories.
- 1999-2000 **Program Manager, Microwave Microscopy, Neocera, Inc., Beltsville, MD**
Responsible for technology transfer from the University of Maryland, commercialization of a measurement tool, investor and customer interactions.
- 1997-1999 **Staff Scientist, Neocera, Inc., Beltsville, MD**
Development of oxide materials for superconducting device applications. Improvements to the Pulsed-Laser Deposition process.
- 1994-1996 **Swiss National Science Foundation and Oak Ridge Associated Universities Postdoctoral Fellow, Oak Ridge National Laboratory**
- 1991-1994 **Research Assistant, IBM Research Division, Zurich Research Laboratory**

Education

- Swiss Federal Institute of Technology (Ecole Polytechnique Fédérale de Lausanne (EPFL)), Lausanne, Switzerland
- Ph.D. 1994 Physics
Thesis: “Dielectric Properties of Perovskites with Polar Disorder ($K_{1-x}Li_xTaO_3$ and $Pb[Mn_{1/3}Nb_{2/3}]O_3$) and of $SrTiO_3$ films”
- M.S. 1991 Physics Engineering (diplôme d’ingénieur)

Research Programs

- 2006-Present Principal Investigator, U.S. Dept. of Energy (DOE) Field Work Proposal ERKCS80: *Interfaces in Epitaxial Complex Oxides*
- 2004-2009 Co-leader, “Emergent Behavior in Nanoscale Systems” (2007-2009) and “Functional Nanomaterials” (2004-2007) Scientific Theme Areas, Center for Nanophase Materials Sciences, Oak Ridge National Laboratory
- 2001-2006 Task Co-Leader, NSET (U.S. Dept. of Energy [DOE], Nanoscale Science, Engineering, and Technology Initiative) Program: *The Emergence of Nanoscale Cooperative Phenomena*
- Principal Investigator: *Highly-polar oxides for photovoltaics beyond p-n junctions* (ORNL Laboratory Directed R&D, 2010-2012), *Deterministic growth of complex oxide nanorods using pulsed-laser deposition* (ORNL Seed Money, 2007-2008), *Interfacial solids* (ORNL Laboratory Directed R&D, 2005-2006), *Development of a combinatorial search apparatus* (ORNL Seed Money, 2001-2002), *Improvement of Spatial Resolution in Microwave Microscopy* (U.S. National Science Foundation - Small Business Innovation Research, Phases I&II, 1998-2000), *Tunable Microwave Materials* (US Air Force Small Business Innovation Research, Phase II, 1997-1999)

Professional Activities, Honors, Awards

- Fellow, American Physical Society (2011)
- International Organizing Committee of the Workshop on Oxide Electronics series, 2012 – present
- Organizer, American Physical Society March Meeting symposium on Dielectric, Ferroelectric, and Piezoelectric Oxides, 2007, 2011 (co-organizer), 2012 (lead)
- Member, Co-organizer, 2010 European Materials Research Spring Meeting Symposium “Frontiers of multifunctional oxides”
- Member, Alabama EPSCoR RII External Advisory Board, 2010-2012
- Member, Program Advisory Committee (PAC), University of Tennessee/ORNL Joint Institute for Advanced Materials (JIAM), 2009–2011
- Member, Proposal Review Panel (PRP), Center for Functional Nanomaterials (CFN) at Brookhaven National Laboratory, 2009–2011
- Reviewer, NSF MRSEC Panel, 2008
- Reviewer, NSF Career Panel, 2005
- Co-organizer, Georgia Tech – Imperial College – ORNL Nanoscience Workshop (2005)
- Reviewer, DOE Peer Review: Superconductivity for Electric Systems/University Panel, 2003
- Co-organizer, Focus Session on Epitaxial Superlattices and Nanostructures, 15th American Conference on Crystal Growth, 2003
- Panelist, International Workshop on Processing and Applications of Superconductors, 2003
- ORNL Research Accomplishment Award, 1999
- Swiss National Science Foundation Fellowship, 1994

Publications and Patents: Author or co-author of more than 150 articles in refereed journals and conference proceedings, over 2900 citations; 4 book chapters; and 7 issued US patents.

Graduate and Postdoctoral Advisors:

Ph.D. Advisors: Andre Chatelain (EPFL, Lausanne), Jochen Mannhart (IBM, Zurich)

Postdoctoral Advisors: Lynn A. Boatner (ORNL), D. P. Norton (ORNL)

Research Interests: Focusing on understanding the influence of epitaxial strain, spatial confinement (size effects), and interfacial mechanisms on the properties of thin films, superlattices, and nanostructures, formed of complex metal-oxides including ferroelectrics, magnetic and multiferroic perovskites, high-temperature superconductors, high-k dielectrics, and optical materials. The research applies and improves pulsed-laser deposition methods for the synthesis of precisely tailored superlattices, as well as novel deposition approaches, such as compositional-spread and temperature-gradient methods. Neutron studies (reflectometry, diffraction) and synchrotron x-ray diffraction are employed for investigations of epitaxial films.