

Alexander K. Tagantsev
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Domains in Ferroic Crystals and Thin Films



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contrast Domains in Ferroic Crystals and Thin Films concentrates on domain related phenomena in nonmagnetic ferroics These materials are still inadequately represented in solid state physics textbooks and monographs *Domain Walls* Dennis Meier, Jan Seidel, Marty Gregg, Ramamoorthy Ramesh, 2020-08-07 Technological evolution and revolution are both driven by the discovery of new functionalities new materials and the design of yet smaller faster and more energy efficient components Progress is being made at a breathtaking pace stimulated by the rapidly growing demand for more powerful and readily available information technology High speed internet and data streaming home automation tablets and smartphones are now necessities for our everyday lives Consumer expectations for progressively more data storage and exchange appear to be insatiable Oxide electronics is a promising and relatively new field that has the potential to trigger major advances in information technology Oxide interfaces are particularly intriguing Here low local symmetry combined with an increased susceptibility to external fields leads to unusual physical properties distinct from those of the homogeneous bulk In this context ferroic domain walls have attracted recent attention as a completely new type of oxide interface In addition to their functional properties such walls are spatially mobile and can be created moved and erased on demand This unique degree of flexibility enables domain walls to take an active role in future devices and hold a great potential as multifunctional 2D systems for nanoelectronics With domain walls as reconfigurable electronic 2D components a new generation of adaptive nano technology and flexible circuitry becomes possible that can be altered and upgraded throughout the lifetime of the device Thus what started out as fundamental research at the limit of accessibility is finally maturing into a promising concept for next generation technology International Tables for Crystallography, Volume D A. Authier, 2014-11-17 International Tables for Crystallography is the definitive resource and reference work for crystallography and structural science Each of the volumes in the series contains articles and tables of data relevant to crystallographic research and to applications of crystallographic methods in all sciences concerned with the structure and properties of materials Emphasis is given to symmetry diffraction methods and techniques of crystal structure determination and the physical and chemical properties of crystals The data are accompanied by discussions of theory practical explanations and examples all of which are useful for teaching Volume D is concerned with the influence of symmetry on the physical and tensor properties of crystals and on their structural phase transitions This role is very important in many different disciplines of the science of materials such as crystallography elasticity solid state physics magnetism optics ferroelectricity and mineralogy and Volume D deals with all these aspects in a unified way The volume is divided into 3 parts Part 1 Introduces the mathematical properties of tensors and group representations and gives their independent components for each of the crystallographic groups Part 2 Devoted to the symmetry aspects of excitations in reciprocal space phonons electrons Raman scattering and Brillouin scattering Part 3 Deals with the symmetry aspects of structural phase transitions and twinning A prominent feature is the joint description of twinning and domain structures which are usually presented in completely separate ways in handbooks of physics and

mineralogy Supplementary software is provided to support and enhance Chapters 1 1 and 1 2 for the determination of irreducible group representations and tensor components and Part 3 on structural phase transitions New to this edition This second edition of Volume D features a new chapter Chapter 1 11 on the tensorial properties of local crystal susceptibilities by V E Dmitrienko A Kirfel and E N Ovchinnikova This chapter describes the symmetry and physical phenomena that allow and restrict forbidden reflections excited at radiation energies close to the X ray absorption edges of atoms Reflections caused by magnetic scattering are also discussed In Part 1 Chapters 1 1 an introduction to the properties of tensors 1 2 on representations of crystallographic groups 1 3 elastic properties 1 5 magnetic properties and 1 10 on tensors in quasiperiodic structures have been revised In particular Chapter 1 5 features a new section on multiferroics by M Kenzelmann Chapter 3 3 on twinning of crystals has been updated and new sections on the effect of twinning in reciprocal space and on the relations between twinning and domain structure have been added Chapter 3 4 on domain structures has also been updated More information on the series can be found at <http://it.iucr.org>

Encyclopedia of Interfacial Chemistry, 2018-03-29
Encyclopedia of Interfacial Chemistry Surface Science and Electrochemistry Seven Volume Set summarizes current fundamental knowledge of interfacial chemistry bringing readers the latest developments in the field As the chemical and physical properties and processes at solid and liquid interfaces are the scientific basis of so many technologies which enhance our lives and create new opportunities its important to highlight how these technologies enable the design and optimization of functional materials for heterogeneous and electro catalysts in food production pollution control energy conversion and storage medical applications requiring biocompatibility drug delivery and more This book provides an interdisciplinary view that lies at the intersection of these fields Presents fundamental knowledge of interfacial chemistry surface science and electrochemistry and provides cutting edge research from academics and practitioners across various fields and global regions

[Ferroelectric Domain Walls](#) Jill Guyonnet, 2014-04-08 Using the nano metric resolution of atomic force microscopy techniques this work explores the rich fundamental physics and novel functionalities of domain walls in ferroelectric materials the nano scale interfaces separating regions of differently oriented spontaneous polarization Due to the local symmetry breaking caused by the change in polarization domain walls are found to possess an unexpected lateral piezoelectric response even when this is symmetry forbidden in the parent material This has interesting potential applications in electromechanical devices based on ferroelectric domain patterning Moreover electrical conduction is shown to arise at domain walls in otherwise insulating lead zirconate titanate the first such observation outside of multiferroic bismuth ferrite due to the tendency of the walls to localize defects The role of defects is then explored in the theoretical framework of disordered elastic interfaces possessing a characteristic roughness scaling and complex dynamic response It is shown that the heterogeneous disorder landscape in ferroelectric thin films leads to a breakdown of the usual self affine roughness possibly related to strong pinning at individual defects Finally the roles of varying environmental conditions and

defect densities in domain switching are explored and shown to be adequately modelled as a competition between screening effects and pinning

Ferroic Materials A. S. Bhalla, 1994 A collection of papers on ferroelectric thin films materials for intelligent smart systems and adaptive structures and processing of thin films Contributors discuss preparation and characteristics of thin films materials design and properties and sensor characteristics The papers were original

EMIF 2 Jean Pierre Ganne, Pierre Abélard, 1998

Ferroelectric Thin Films XII: Volume 784, 2004-04-09 The MRS Symposium Proceeding series is an internationally recognised reference suitable for researchers and practitioners This book first published in 2004 offers scientific and technological information on ferroelectric thin films from an international mix of academia industry and government organizations

Ferroelectric Thin Films, 2005

Physics Briefs, 1992

Multicomponent Oxide Films for Electronics: Volume 574 Marilyn Hawley, 1999-10-06 The exceptional properties of multicomponent oxides combined with the inability of simpler materials to meet the increasing demands of the electronics industry have motivated tremendous interest and activity in utilizing multicomponent oxides for electronic applications For these applications it is often desirable to integrate complex oxides in thin film form with other materials This book focuses on common materials issues involved in the processing and characterization of multicomponent oxides and how these issues relate to device applications Papers range from theoretical explanations of the magnetic and electronic properties of transition metal oxides to integration with silicon technology Noteworthy is the progress being made in the deposition and characterization of these complex materials as well as their applicability in ferroelectric memories MOSFETs optical devices infrared imaging arrays etc Topics include epitaxial multicomponent oxide film growth properties characterization and modeling properties of multicomponent oxides and multicomponent oxide devices

Nature Sir Norman Lockyer, 2008

Applied Science & Technology Index, 1996

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Handbook of Magnetism and Advanced Magnetic Materials, 5 Volume Set Helmut Kronmüller, Stuart Parkin, 2007-09-11 From the first application of the oxide magnetite as a compass in China in ancient times and from the early middle ages in Europe magnetic materials have become an indispensable part of our daily life Magnetic materials are used ubiquitously in the modern world in fields as diverse as for example electrical energy transport high power electro motors and generators telecommunication systems navigation equipment aviation and space operations micromechanical automation medicine magnetocaloric refrigeration computer science high density recording non destructive testing of materials and in many household applications Research in many of these areas continues apace The progress made in recent years in computational sciences and advanced material preparation techniques has dramatically improved our knowledge of fundamental properties and increased our ability to produce materials with highly tailored magnetic properties even down to the nanoscale dimension Containing approximately 120

chapters written and edited by acknowledged world leaders in the field The Handbook of Magnetism and Advanced Magnetic Materials provides a state of the art comprehensive overview of our current understanding of the fundamental properties of magnetically ordered materials and their use in a wide range of sophisticated applications The Handbook is published in five themed volumes as follows Volume 1 Fundamentals and Theory Volume 2 Micromagnetism Volume 3 Novel Techniques for Characterizing and Preparing Samples Volume 4 Novel Materials Volume 5 Spintronics and Magnetoelectronics

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