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# Magnetic Thin Films, Multilayers and Superlattices

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NORTH-HOLLAND

# Magnetic Thin Films Multilayers And Superlattices

**Farzad Nasirpouri, Alain Nogaret**



## **Magnetic Thin Films Multilayers And Superlattices:**

**Magnetic Thin Films, Multilayers and Superlattices** A. Fert, G. Güntherodt, B. Heinrich, E.E. Marinero, M. Maurer, 1991-06-06 Materials Research in thin and ultrathin magnetic structures is a multidisciplinary field which heavily relies on state of the art growth characterization and theoretical approaches to build a comprehensive physical picture on how magnetic properties depend on interfacial structural issues interlayer coupling and transport phenomena Often in this field the critical properties and characterization required necessitates knowledge of structural and magnetic phenomena extending over several atomic planes Atomic controlled growth techniques are required and atomic sensitivity is needed from magnetic and structural probes This critical knowledge is vital for device applications providing the basis for the synergistic interactions that are predominant in this field of research This volume is the definitive reference source for anyone interested in the latest advances and results of current experimental research in ultrathin film magnetism *Magnetic Thin Films, Multilayers and Superlattices* A. Fert, G. Güntherodt, 1991 **Magnetic Thin Films, Multilayers, and Superlattices** A. Fert, 1991-01-01 Materials Research in thin and ultrathin magnetic structures is a multidisciplinary field which heavily relies on state of the art growth characterization and theoretical approaches to build a comprehensive physical picture on how magnetic properties depend on interfacial structural issues interlayer coupling and transport phenomena Often in this field the critical properties and characterization required necessitates knowledge of structural and magnetic phenomena extending over several atomic planes Atomic controlled growth techniques are required and atomic sensitivity is needed from magnetic and structural probes This critical knowledge is vital for device applications providing the basis for the synergistic interactions that are predominant in this field of research This volume is the definitive reference source for anyone interested in the latest advances and results of current experimental research in ultrathin film magnetism Magnetic Thin Films, Multilayers and Superlattices A. Fert, European Materials Research Society. Spring Conference. Symposium C, 1991

*Magnetic Ultra Thin Films, Multilayers and Surfaces* F. Petroff, M.A.M. Gijs, 1997-12-18 The Symposium on Magnetic Ultrathin Films Multilayers and Surfaces hosted by the European Materials Research Society was held at the Palais de la Musique et des Congr in Strasbourg France on June 4 7 1996 Its central theme was the relationship of magnetic properties and device performance to structure at the nano and micrometer length scale Research on the magnetism of surfaces ultrathin films and multilayers has increased dramatically during recent years This development was triggered by the discovery of coupling between ferromagnetic layers across nonmagnetic spacer layers and of the giant magnetoresistance effect in systems of reduced dimension using various micro and nanofabrication techniques has become a subject of special interest It is certainly the promising application potential of these effects in new magnetic recording device geometries which causes this intensive research which is done both by companies and at universities and research institutes A selection of invited and contributed papers presented at the Symposium and accepted for publication is contained in this volume The

contents of these proceedings are organized into seven sections A Nanowires Nanoparticles Nanostructuring B Ultrathin Films and Surfaces Characterization C Giant Magnetoresistance D Coupling Tunneling E Growth Structure Magnetism F Growth Structure Magnetoresistance G Coupling Magnetic processes Magneto optics The first four sections contain invited and oral contributed papers in the listed research domains while the last three sections contain the contributions presented during three large poster sessions

**Handbook of Thin Films, Five-Volume Set** Hari Singh Nalwa, 2001-10-29 This five volume handbook focuses on processing techniques characterization methods and physical properties of thin films thin layers of insulating conducting or semiconductor material The editor has composed five separate thematic volumes on thin films of metals semimetals glasses ceramics alloys organics diamonds graphites porous materials noncrystalline solids supramolecules polymers copolymers biopolymers composites blends activated carbons intermetallics chalcogenides dyes pigments nanostructured materials biomaterials inorganic polymer composites organoceramics metallocenes disordered systems liquid crystals quasicrystals and layered structures Thin films is a field of the utmost importance in today s materials science electrical engineering and applied solid state physics with both research and industrial applications in microelectronics computer manufacturing and physical devices Advanced high performance computers high definition TV digital camcorders sensitive broadband imaging systems flat panel displays robotic systems and medical electronics and diagnostics are but a few examples of miniaturized device technologies that depend the utilization of thin film materials The Handbook of Thin Films Materials is a comprehensive reference focusing on processing techniques characterization methods and physical properties of these thin film materials

Handbook of Thin Films Hari Singh Nalwa, 2001-11-17 This five volume handbook focuses on processing techniques characterization methods and physical properties of thin films thin layers of insulating conducting or semiconductor material The editor has composed five separate thematic volumes on thin films of metals semimetals glasses ceramics alloys organics diamonds graphites porous materials noncrystalline solids supramolecules polymers copolymers biopolymers composites blends activated carbons intermetallics chalcogenides dyes pigments nanostructured materials biomaterials inorganic polymer composites organoceramics metallocenes disordered systems liquid crystals quasicrystals and layered structures Thin films is a field of the utmost importance in today s materials science electrical engineering and applied solid state physics with both research and industrial applications in microelectronics computer manufacturing and physical devices Advanced high performance computers high definition TV digital camcorders sensitive broadband imaging systems flat panel displays robotic systems and medical electronics and diagnostics are but a few examples of miniaturized device technologies that depend the utilization of thin film materials The Handbook of Thin Films Materials is a comprehensive reference focusing on processing techniques characterization methods and physical properties of these thin film materials

Magnetic Heterostructures H. Zabel, Samuel D. Bader, 2007-10-26 Heterostructures consist of combinations of different materials which are in contact through at least one interface Magnetic

heterostructures combine different physical properties which do not exist in nature Examples are semiconductors ferromagnets superconductors ferromagnets or ferromagnets antiferromagnets These combinations display new physical properties different from any single one of them Interlayer exchange coupling exchange bias proximity effects giant magnetoresistance tunneling magnetoresistance spin injection and spin transport are examples for new physical phenomena which rely on the combination of various metal semiconductor and oxide layers Heterostructures are generated by stack wise deposition of these materials layers and by lateral structuring them via lithographic processes This book provides the first comprehensive overview of an exciting and fast developing field of research which has already resulted in numerous applications and is the basis for future spintronic devices

**Nanomagnetism and Spintronics** Farzad Nasirpour, Alain Nogaret, 2011 Nanomagnetism and spintronics are two close subfields of nanoscience explaining the effect of substantial magnetic properties of matter when the materials fabrication is realized at a comparable length size Nanomagnetism deals with the magnetic phenomena specific to the structures having dimensions in the submicron range The fact that the electronic transport properties of materials are dependent on the magnetic properties artificial nanostructures i e giant magnetoresistance GMR or tunneling magnetoresistance TMR has revolutionized spintronics science and technology This book explains the concepts of nanomagnetism and spintronics by viewing the most recent research works from internationally distinguished research groups Placing special emphasis on crucial fundamental and technical aspects of nanomagnetism and spintronics it serves as a one stop reference for universities offering postgraduate programs in nanotechnology or related disciplines This unique book deals with all three stages required for conducting research in nanomagnetism and spintronics including fabrication characterization and applications of nanomagnetic and spintronics materials providing general concepts and an insightful overview of this subject for research students and scientists from different backgrounds investigating the multidisciplinary area of nanotechnology

Polyconjugated Materials G. Zerbi, 1992-12-04 In the past ten years the science of Polyconjugated Organic Materials has grown rapidly and is now experiencing the uncorrelated explosive development typical of a new science The transfer of the basic scientific knowledge of these materials to the field of technology and industry is presently the focus of interest in academic and industrial circles New devices are being developed which are paving the way for future technologies Organic materials have become the focus of attention in these technologies The large and very fast nonlinear optical response of organic molecules has generated new theoretical and experimental physics as well as new synthetic chemistry The advancement of knowledge and the new achievements in this field require the interdisciplinary practice of chemists physicists and engineers who can talk the same technical language on molecular systems which show specific physical properties The purpose of this book is to introduce beginners to the field of nonlinear optics in organic materials and to expose specialists in one field to the problems of the other fields Since organic molecules with a large and very fast nonlinear optical response are being continuously discovered

the contributions focus on this class of materials The volume provides a useful introduction for all those interested in the theoretical and experimental aspects of this expanding field      Clays and Hydrosilicate Gels in Nuclear Fields A.

Meunier,1992-10-09 Research on issues relating to nuclear waste storage plays an important role in contributing to finding good solutions to a problem that concerns mankind's future predicting the durability of engineered barriers and determining the kinetics of alteration processes The latter is now one of the vital questions in the scientific community concerned with clay minerals and hydrosilicate gels The 20 papers published in this volume bring together the experience of specialists on topics such as hydrosilicate gels and early mineral phase crystallization clay mineral reactions and crystallochemistry of clay minerals The contributions are of world wide interest and will help to stimulate future research and analysis in this field

**Nuclear Methods in Semiconductor Physics** G. Langouche,J.C. Soares,J.P. Stoquert,1992-04-01 The two areas of experimental research explored in this volume are the Hyperfine Interaction Methods focusing on the microscopic configuration surrounding radioactive probe atoms in semiconductors and Ion Beam Techniques using scattering energy loss and channeling properties of highly energetic ions penetrating in semiconductors A large area of interesting local defect studies is discussed Less commonly used methods in the semiconductor field such as nuclear magnetic resonance electron nuclear double resonance muon spin resonance and positron annihilation are also reviewed The broad scope of the contributions clearly demonstrates the growing interest in the use of sometimes fairly unconventional nuclear methods in the field of semiconductor physics      *High Energy and High Dose Ion Implantation* S.U. Campisano,J. Gyulai,J.A. Kilner,P.L.F.

Hemment,1992-06-16 Ion beam processing is a means of producing both novel materials and structures The contributions in this volume strongly focus on this aspect and include many papers reporting on the modification of the electrical and structural properties of the target materials both metals and semiconductors as well as the synthesis of buried and surface compound layers Many examples on the applications of high energy and high dose ion implantation are also given All of the papers from Symposia C and D are presented in this single volume because the interests of many of the participants span both topics Additionally many of the materials science aspects including experimental methods equipment and processing problems diagnostic and analytical techniques are common to both symposia      **Nuclear Materials for Fission Reactors**

H. Matzke,G. Schumacher,2012-12-02 This volume brings together 47 papers from scientists involved in the fabrication of new nuclear fuels in basic research of nuclear materials their application and technology as well as in computer codes and modelling of fuel behaviour The main emphasis is on progress in the development of non oxide fuels besides reporting advances in the more conventional oxide fuels The two currently performed large reactor safety programmes CORA and PHEBUS FP are described in invited lectures The contributions review basic property measurements as well as the present state of fuel performance modelling The performance of today's nuclear fuel hence UO<sub>2</sub> at high burnup is also reviewed with particular emphasis on the recently observed phenomenon of grain subdivision in the cold part of the oxide fuel at high

burnup the so called rim effect Similar phenomena can be simulated by ion implantation in order to better elucidate the underlying mechanism and reviews on high resolution electron microscopy provide further information The papers will provide a useful treatise of views ideas and new results for all those scientists and engineers involved in the specific questions of current nuclear waste management

**High Tc Superconductors** J. Dumas,H.W. Neumüller,H.F. Braun,V.P. Seminozhenko,Yu.D. Tretyakov,1993-05-05 A wide range of progress in materials development single crystals ceramics thin films wire and tapes is reported in the 169 papers in this volume The main focus of the papers is in attaining a better understanding of the relationship between microstructure and electrical properties Invited papers cover topics such as the effects of substitution and doping multilayers nanostructure characterisation electric field effects in High Tc Superconductors HTS surface stability critical currents flux pinning and magneto optic imaging of flux patterns effects of irradiation induced defects properties and preparation of materials microwave properties and electronic devices A clearly broadened basis for understanding processes and mechanisms in HTS is portrayed Appreciable progress has been achieved in the reproducible manufacturing of high quality materials supported by very efficient methods in microstructural analysis This essential improvement is reflected in the increased number of practical devices encouraging the use of HTS in applications for electronics and power engineering all of which are reviewed in depth in this work

Laser Surface Processing and Characterization I.W. Boyd,1992-03-09 The contributions in this volume reflect not only the growing understanding of the underlying mechanisms controlling the various reactions in laser surface processing but also the potential of several developing applications of direct processing The most notable trend in the field currently is the technique of laser ablation which is reported in almost a quarter of the papers in this volume Whilst by no means a new phenomenon attention has until recent years remained in the area of lithography and UV sensitive materials The growth in interest lies in the use of the technique to grow multi component thin films and multi layers A number of papers on the topic of process diagnostics and in situ measurements are also included The theme of these annual meetings is centred around the physical and chemical modification of thin films and surfaces induced by the action of photon ion neutral or electron beams in a variety of environments Consequently these proceedings provide a comprehensive and unified presentation of the latest developments in this field

*Semiconductor Materials for Optoelectronics and LTMBE Materials* J.P. Hirtz,C. Whitehouse,H.P. Meier,H.J. von Bardeleben,M.O. Manasreh,2016-07-29 These three day symposia were designed to provide a link between specialists from university or industry who work in different fields of semiconductor optoelectronics Symposium A dealt with topics including epitaxial growth of III V II VI IV VI Si based structures selective area localized and non planar epitaxy shadow mask epitaxy bulk and new optoelectronic materials polymers for optoelectronics Symposium B dealt with III V epitaxial layers grown by low temperature molecular beam epitaxy a subject which has undergone rapid development in the last three years

*Micronic Integrated Sensors* J.L. Robert,1992-10-09 Progress in material research

recent developments in growth techniques as well as in processing technology and modelling have had a great impact on sensors. The contributions in this volume will be of interest to all those who wish to keep abreast of recent developments in the interdisciplinary field of sensor research.

**Modifications Induced by Irradiation in Glasses** P. Mazzoldi, 2012-12-02

Many aspects of the interaction of radiation with glasses are reviewed in this volume with contributions from a broad scientific community. Several of the papers focus on the interdisciplinary approach required to connect technological applications to the basic interactions of energetic ions with insulators, reporting on the challenging problems that still remain to be solved. The high quality of these contributions once again demonstrates that the E MRS is an efficient forum for interaction between research workers and industry. The proceedings represent an ideal bridge between the sixth and the planned seventh International Conference on Radiation Effects in Insulators to be held in Japan in 1993.

**SiGe Based Technologies** Y. Shiraki, T.P. Pearsall, Erwin Kasper, 1993-02-18

The preparation of silicon germanium microstructures, their physical, chemical and electrical characterization and their device processing and application are reviewed in this book. Special emphasis is given to ultrathin Si-Ge superlattices. Topics covered include: Wafer preparation and epitaxial growth; surface effects; driven phenomena such as clustering, segregation, surfactants; Analysis both in situ and ex situ; Strain adjustment methods; High quality buffers; Modification of material properties by quantum wells and superlattices; Devices; Novel concepts; processing; modelling; demonstrators. The questions highlighted particularly those articles comparing related or competing activities will provide a wealth of knowledge for all those interested in the future avenues of theory and applications in this field.



## Unveiling the Magic of Words: A Overview of "**Magnetic Thin Films Multilayers And Superlattices**"

In a global defined by information and interconnectivity, the enchanting power of words has acquired unparalleled significance. Their ability to kindle emotions, provoke contemplation, and ignite transformative change is actually awe-inspiring. Enter the realm of "**Magnetic Thin Films Multilayers And Superlattices**," a mesmerizing literary masterpiece penned with a distinguished author, guiding readers on a profound journey to unravel the secrets and potential hidden within every word. In this critique, we shall delve into the book is central themes, examine its distinctive writing style, and assess its profound impact on the souls of its readers.

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