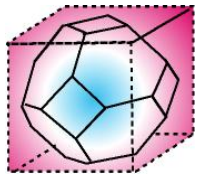


The Egyptian Materials Research Society
(Eg-MRS)

(Former: The Egyptian Society of Solid State Science and Applications)

Eg-MRS 2005

THE XXV CONFERENCE ON

Solid State Physics and Materials Science

&

WORKSHOP ON

Photonic Materials and Optoelectronic Devices (II)

6 -10 March 2005
Luxor, Upper Egypt

THE CONFERENCE

IS HELD UNDER THE AUSPICES OF

Hon. Adel Labib

Governer of Kena

Prof. Dr. Abd El-Mateen Mousa

President of South Valley University

Dr. Samir Farag

President of Luxor Supreme Council

HONORARY CHAIRMANSHIP

Prof. Dr. Raafat K. Wasef

Cairo University

Prof. Dr. Fawzy Hammad

Atomic Energy Authority

Contents

BOARD

Conference Chairman:

Prof. Dr. Kamal Abd El-Hady — Minia Univ.

Conference Co-Chairman:

Prof. Dr. Fakhry Abd El-Salam — Ain Shams Univ.
Prof. Dr. Mohamed Z. Yousef — South Valley

Workshop International Organizer:

Prof. Dr. Hanns-Ulrich Habermeier — Max-Planck-Institut, Stuttgart

Workshop Chairman:

Prof. Dr. M. Hassan Talaat — Ain Shams Univ.

Workshop Co-Chairman:

Prof. Dr. Ahmed A. Ramadan — Helwan Univ.
Prof. Dr. G. A. Gamal — South Valley

Organizing Committee:

Prof. Dr. Fayez Shahin — Cairo Univ., Beni-Suef
Prof. Dr. Hassan Afify — NRC, Cairo
Prof. Dr. Hesham M. Talaat — Al-Azhar Univ.
Prof. Dr. Mohamed El-Okr — Al-Azhar Univ.
Prof. Dr. Sherif A. Khairy — Cairo Univ.

Local Organizing Committee:

(South Valley University)

Prof. Dr. Mahmoud Dongol
Dr. Mohamed Nassary
Dr. Melaad K. Gergs

Sponsors:

Academy of Scientific Research and Technology, Egypt.
South Valley University, Egypt.

Objectives

CONFERENCE

The aim of the conference is to provide a forum for exchange of knowledge in the high interdisciplinary fields of solid state physics and materials science as well as to bring together scientists working in academic and applied research areas for constructive interactions.

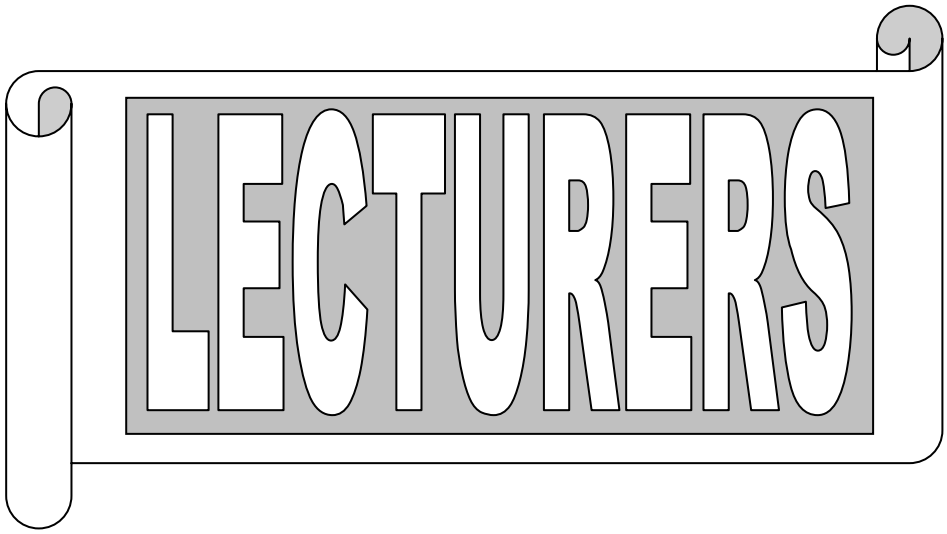
The topics to be covered are:

* Semiconductor physics and devices.
* Metal physics.
* Superconductivity.
* Thin films.
* Optoelectronic Materials.
* Solar Energy Materials and Devices.
* Magnetism and Magneto-optics.
* Crystallography and Amorphography.
* Polymer Physics.
* Spectroscopy and Optical Properties.
* Surface Physics.

WORKSHOP

The overwhelming success of last year workshop on photonics and optoelectronics that was greatly enjoyed by the international speakers and greatly appreciated by the attendants, and the unfinished expose covering of this ever growing field, have compelled the organizing committee to initiate this successor workshop. Henceforth, the workshop this year covers more areas in fields such as:

- Investigation and characterization of photonic crystals and photonic band gap effects
- Fabrication of photonic structures and devices
- Micro- and nano-photonic devices
- Micro-optical-electro-mechanical-systems (MOEMS)
- Plasmonics


LECTURERS

- *Prof. Dr. Javier Alda (Ald)*
  Optics Department,
  University Complutense of Madrid,
  School of Optics,
  Av. Arcos de Jalón s/n.28037 Madrid,
  Spain.
  E-mail: j.alda@fis.ucm.es

Biography

Javier Alda is Professor in the School of Optics of the University Complutense of Madrid (Spain) since 1991. He works at the Optics Department since 1985. He achieved his PhD in 1988 at the University Complutense. In 1985 he graduated in Sciences at the University of Zaragoza (Spain). He has been working in a variety of research project in Applied Optics within the activities of the Optics Department of the University Complutense of Madrid. Some of these project have been conducted in association with private companies for the the improvement and testing of their products. He has been Visiting Researcher in CREOL / School of Optics (University of Central Florida, Orlando, FL, USA) for more than two years. He also has been Visiting Scholar in the Ginzton Laboratory of the Stanford University, Stanford, CA, USA.

He has co-authored of more than 60 research papers in several fields of Applied Optics. In his academic activities he has been supervising 4 PhD dissertations, and 2 Graduation Projects. He has been teaching in several subjects of the Undergraduated studies in Optics and Optometry, and also in the PhD program of the Optics Department of the University Complutense.

- *Kiyoshi Asakawa (Asa)*
TARA Center, University of Tsukuba, Tennodai,
Tsukuba 305-8577,
and
The Femtosecond Technology Research
Association (FESTA),5-5 Tokodai,
Tsukuba 300-2635,
Japan.
Tel/Fax: 81-29-853-6423
E-mail: asakawa@tara.tsukuba.ac.jp

Biography

Mr. Kiyoshi Asakawa received his Bachelor of Engineering degree from University of Tokyo in 1968 and joined NEC central research laboratories, where he was engaged in the development of SAW- and $LiNbO_3$-based devices. From 1981 to 1987, he was on assignment at Optoelectronic Joint Research Laboratory (OJRL) to work on the III-V compound semiconductor dry etching for photonic devices. In 1992, he received his Doctor of Engineering degree from University of Tokyo. From 1996 to 2004, he was engaged in the Femtosecond Technology Research Association (FESTA), where he developed nano-processing technologies for photonic crystals and quantum dots for ultra-fast photonic devices. In 2004, he retired NEC and moved to University of Tsukuba, where he is currently continuing the work on the nano-photonics under the collaboration with the FESTA. He was a visiting researcher with Prof. J. Merz at UCSB in 1987 and a visiting professor of Hokkaido University in 1998 and 2001.

- *Niloy K. Dutta (Dut)*
  Department of Physics,
  University of Connecticut,
  Storrs, CT, USA.
  E-mail: niloy@engr.uconn.edu

Biography

Niloy K. Dutta received his MS and PhD in Physics from Cornell University in 1976 and 1978, respectively. He received his BSc (Honours) and MSc in Physics from St. Stephen`s College, New Delhi in 1972 and 1974, respectively. Since 1997 he has been a Professor of Physics and Associate Director of Photonics Research Center at the University of Connecticut. Prior to that from 1990 to 1997 he was Head of Optoelectronic Device Research Department at Bell Laboratories at Murray Hill, NJ.

In 1976 he conducted the first experiments on intracavity absorption spectroscopy using a tunable infrared laser. In 1978 he reported the first observation of resonant photoexcited charge transfer.

He joined Bell Laboratories in 1979 where he has made numerous contributions to the research and development of semiconductor lasers for lightwave transmission systems. His many significant research accomplishments include explanation of the high temperature performance of long wavelength semiconductor lasers, first InGaAsP quantum well laser, first tunable Bragg reflector laser, first 10 Gb/s lightwave transmission field experiment, first coherent transmission field experiment, and two dimensional optical interconnection systems.

He joined the University of Connecticut in 1997 as Professor of Physics. His current research programs include high speed optical

transmission, optical networks, photonic logic devices and circuits, fiber lasers and optical coherence tomography.

He has published over 300 papers and 20 review chapters on semiconductor lasers, optical amplifiers, coherent transmission systems , optoelectronic integration, device physics and lightwave telecommunication system experiments. He has published a book on " Long Wavelength Semiconductor Lasers " and a second with the title " Semiconductor Lasers ". He has edited and co-authored: " Vertical Cavity Surface Emitting Lasers", " WDM Technologies – Active Optical Components ","WDM Technologies – Passive Optical Components", and, "WDM Technologies – Networks"

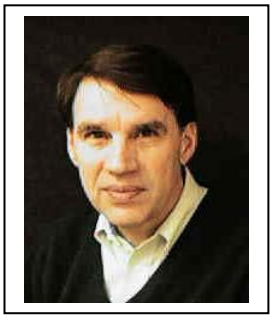
He is a Fellow of the Institute of Electrical Engineers (IEEE), the Optical Society of America and the International Society of Optical Engineers (SPIE). He received the LEOS Distinguished Lecturer Award in 1995. He is a Member of Connecticut Academy of Science and Engineering.

▪ *Hanns-Ulrich Habermeier (Hab)*
Max-Planck-Institut für Festkrperforschung,
Heisenbergstr. 1, D 70569 Stuttgart,
Germany
Tel.: +49-711-689-1372
FAX: +49-711-689-1389
e-mail: huh@fkf.mpg.de

Biography

Prof Dr. Hanns-Ulrich Habermeier received his PhD from University Stuttgart, Germany, 1974 and worked as a staff member at the University Stuttgart / Max-Planck-Institut for Metal Research, Stuttgart from 1974 through 1977 in the field of flux pinning in super-conductors. He joined the IBM Thomas Watson Research Laboratory, Yorktown Heights, N.Y.,U.S.A. 1978-79 focusing his interest on quantum localization and A–15 super-conducting thin films. 1980 he was appointed to be the Head of the Technology Group at the Max-Planck-Institute for Solid State Research, Stuttgart, Germany 1980. His interests covered the area of process-induced defects in semiconductors, semiconductor process technology. Starting with the discovery of cuprate superconductors his interest shifted towards thin film physics and thin film technology of functional ceramics. Since 1997 he is Honorary Professor and Member of Faculty of Yunnan Polytechnic University, Kunming, P.R. Of China and since 2000 Honorary Professor and Member of Faculty of Kunming University of Science and Technology [KUST] P.R. of China. Furthermore, Prof. Habermeier is a member of the Executive Committee of EMRS since 1995 and served as E-MRS Vice President / President 1996-99 and as Treasurer of IUMRS 2000-2002. Additionally, he is the Secretary of the European Society for Applied Superconductivity [ESAS] since 2000.

- *Richard F. Haglund, Jr. (Hag)*
  Department of Physics and Astronomy
  Vanderbilt University, Nashville TN 37235
  U.S.A.
  E-mail : richard.haglund@vanderbilt.edu
  URL: http://sitemason.vanderbilt.edu/physics/aopg/home



Biography

Richard Haglund was educated at Wesleyan University (B.A., Physics 1967), and received the Ph.D. from the University of North Carolina, Chapel Hill for a dissertation on nuclear reaction studies with spin-polarized deuterons. Following a post-doctoral appointment at the Los Alamos National Laboratory, he remained as a staff member at Los Alamos, working in an experimental laser physics group specializing in the design and construction of large CO_2 and KrF lasers for fusion experiments. In 1984, he was appointed to the faculty of Vanderbilt University in the Department of Physics and Astronomy. At Vanderbilt, Professor Haglund became one of the leaders in the development of Vanderbilt's free-electron laser center, and chaired the Department for three years beginning in 1999. His current areas of research are centered on laser spectroscopy and laser processing of materials, including nonlinear optics and ultrafast spectroscopy of metal and metal-oxide nanoparticles; pulsed laser deposition of organic thin films; and laser mass spectrometry of biological molecules using picosecond infrared radiation. He received an Alexander von Humboldt Foundation Senior Scientist Award in 2003, and is a member of Phi Beta Kappa and Sigma Xi honorary societies.

- *Lyudmyla A. Karachevtseva (Kar)*

V. Lashkariov Institute of
Semiconductor Physics of NAS of Ukraine;
41 Nauki Prsp., Kiev-03028,
Ukraine.
Tel.:(8-044)265-98-15,
Fax: (8-044)265-83-42,
E-mail: lakar@isp.kiev.ua

Biography

Lyudmyla Karachevtseva was born in 1949**.** *Education:* M.S. in Optics&Spectroscopy, 1971, State University of Dnepropetrovsk, Ukraine; Ph.D. in Physics&Mathematics, 1975, Institute of Physics, Kiev, Ukraine; Rank Senior Researcher in Materials Science, 1988, Presidium of Academy of Scienses of the USSR; Second Degree Doctor of Science (Tech.,) 1996, Industrial Institute of Kherson, Ukraine. *Carrier/employment:* V. Lashkarev Institute of Semiconductor Physics of National Academy of Sciences of Ukraine; Head of Scientific Group, 1977-1998; Head of Department, 1998 – present. *Specialization:* main field - Physics&Mathematics; other field - Materials Science; current research interests - Semiconductor Physics, Photonic Crystals, Electrochemistry. She has published more than 150 scientific works.

- *Akaira Ishibashi (Ish)*

Laboratory of Quantum Electronics
Research Institute for Electronic Science
Hokkaido University, Sapporo 060-0812, Japan.
Phone: +81-11-706-2881
Fax: +81-11-706-2883
E-mail : I-Akira@es.hokudai.ac.jp

Biography

Date of birth: July 17, 1958, Saga-city, Saga, Japan.

Academic background:
1981: B. Sc., University of Tokyo (Physics).
1983: M. Sc., University of Tokyo (High Energy Physics/ Experimental elementary particle physics).
1990: Ph. D., University of Tokyo (Physics).

Professional career:
1982-1983: Lawrence Berkeley National Lab. (LBNL, at that time LBL), Research Assistant.
1983-1990: Sony Corporation Research Center, Physicist Studied LO-phonon confinement and new electronic states in (AlAs)m(GaAs)n ultrathin-layer superlattices.
1990-1991: Univ. of Illinois at Urbana-Champaign, John Bardeen Chair Visiting Faculty.
1991-1992: Sony Corp. Res. Ctr., AlGaInP Red-emitting Laser Diode Gp. Leader.
1993-1998: Sony Corp. Res. Ctr., Blue Laser Diode Project Leader Achieved world-first room-temperature CW operation of blue laser diode using ZnMgSSe-based II-VI semiconductors in 1993, and longest device-life time of 500 hours for II-VI blue LDs in 1998.

l998-1998: Visiting Professor, Center for Interdisciplinary Research, Tohoku University.

1999-2002: Sony Corp., Frontier Science Laboratories, Biomorphic Materials Initiative Leader.

2003-present: Head of Laboratory of Quantum Electronics, Research Institute for Electronic Science, Hokkaido University.

Publications and Patents

He is an author of more than 160 papers, and has filed more than 200 patents (> 150 in Japanese domestic, and > 50 in US and PCT world-wide).

▪ *Rainer Michalzik (Mic)*
University of Ulm, Optoelectronics Dept.
Albert-Einstein-Allee 45, D-89069 Ulm,
Germany
Tel: +49-731-50-26048 or -26050,
Fax: +49-731-50-26049
E-mail: rainer.michalzik@e-technik.uni-ulm.de
URL: http://www-opto.e-technik.uni-ulm.de/

Biography

Rainer Michalzik received the Dipl.-Ing. degree in electrical engineering from the Technical University of Braunschweig, Germany, in 1989 and the Dr.-Ing. degree from the University of Ulm, Germany, in 1996. In 1999 and 2000, he was a Guest Scientist at Bell Labs, Lucent Technologies, Holmdel, NJ. He is currently heading the VCSELs and Optical Interconnects Group in the Optoelectronics Department of Ulm University with major research interests in vertical-cavity surface-emitting laser (VCSEL) design, fabrication, and applications, parallel and high-speed optical communication systems, as well as conventional semiconductor lasers and optical modulators. He has co-authored more than 170 technical papers, two book chapters and has given more than 20 invited talks at international conferences. Dr. Michalzik was awarded with the Heinz Maier-Leibnitz Prize of the Deutsche Forschungsgemeinschaft (DFG) and the Federal Ministry of Education and Research (BMBF) in 1999 and the Merckle Research Prize in 2003.

- *Lotfya El-Nady*
  Physics Department, Faculty of Science,
  Cairo University,
  Egypt.
  Home Tel. : (+202) 2580753,
  Office Tel. : (+202) 5676773,
  Mobile : (+2012) 2436642
  Fax : (202) 2918059
  E-mail : lotfianadi@hotmail.com
  : lotfianadi@mailer.eun.eg

Biography

Birth Date : August 4, 1934 –Cairo –Egypt
Sex : Female
Married to : Engineer Hussein Fawzy
Children : Mai, 26/3/1965-Architect Eng. 1990
Yasser, 26/3/1976-Architect Eng. 1999
Nationality : Egyptian
Religion : Muslim
Address : 6 Cobba St., Roxy, Heliopolis, Egypt

Education

- B.Sc. (Honor) Physics & Chemistry, Cairo University, Faculty of Science, June (1956)
- M.Sc. Degree, Birmingham University, UK, Dec. (1960) in Radiation Physics, thesis entitled “Neutron Deficient Nuclei in α-particle Spallation Reactions.” supervised by Prof. Drs. C. Chucket, W. Burcham and J. Moon.
- Ph.D. Degree, Cairo University, Egypt, Nov. (1964) in Nuclear Physics, thesis entitled “Energy Levels of Si28 produced by proton capture reactions in A127 " supervised by Prof. Drs. M.A. Maksood El Nadi and P.V. Sorokin.

Scientific Interests

- Experimental Nuclear Physics Starting 1956 immediately after B.Sc. graduation, did research in Nuclear Reactions, Nuclear Spectroscopy and Radiation Physics.

- Introduced Physics of Thin Films in the Physics Department, Cairo University since 1970 where studies are done in the following fields of this topic:
- Preparation of metallic and non metallic thin films under high vacuum evaporation and sputtering techniques.
- Studies of the electrical properties.
- Studies of structural properties using Electron Microscopy.
- Established Laser Physics Laboratory since 1980 at the Faculty of Science, Cairo University in collaboration with IPP Julich Laboratory KFA Germany and Academy of Scientific Research Egypt, completed Jan.1987.
- Established Electron Microscopy Lab. at the Physics Dept. March 1982.
- Established the laboratory of Microarc Plasma through collaboration with Prof. E. Hintz from IPP Julich, KFA, Germany Jan. 1984 in Cairo Univ.
- Established the National Center of Laser and Applications at the Faculty of Science, Cairo University Jan. 1990 till now through funds of USA AID and support of the Egyptian Government.
- Established the National Institute of Laser Enhanced Science NILES, at Cairo University 1994 through Project that started 1985 funded from USA AID and Ministry of International Cooperation Egypt.

Positions Held

- Demonstrator Atomic Energy Establishment-Cairo Oct. (1956-l964)
- Lecturer Atomic Energy Authority-Cairo Jan. (1965-1969)
- Associate Professor-Physics Dept., Faculty of Science, Cairo University Dec. (1969-1975)
- Associate Professor-Physics Dept., Qatar University, Qatar Sept.
- (1973-1976)
- Professor of Experimental Nuclear Physics-Physics Dept., Faculty of Science, Cairo University Dec. (1975-1994)
- Head of Physics Dept., Faculty of Science, Cairo University June (1979-1985)

- Professor of Nuclear Physics-Physics Dept., King A. Azziz University, Saudi Arabia Sept. (1988-1989)
- Principal Investigator of Laser Physics & Applications Laboratory, Faculty of Science, Cairo University since Feb. 1980.
- Director of the National Center of Lasers & Applications, Faculty Of Science and NILES Oct. (1990-1997)
- Head of Physics Dept., Faculty of Science, Cairo University June (1991-1994)
- Professor Emerites Faculty of Science, Cairo University, since August 1994.
- Professor of Laser Physics, Faculty of Science, Qatar University, since Sept. 1995, on leave of absence from Cairo University.

Society Memberships

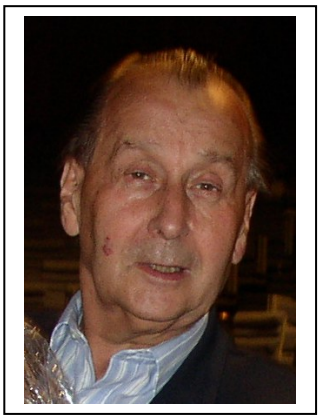
- President of the Topical Society of Laser Science since Feb. 1991, Egypt.
- Vice President of the Topical Society of Laser Science Feb. (1987-1991)
- Member of the Egyptian Society of Physics since 1969.
- Treasurer Egyptian Physical Society Feb. (1977-l 988)
- Member of the Egyptian Society of Mathematical and Physical Sciences since Feb. 1969.
- Member of the Egyptian Solid State Society since Oct. 197 1.
- Member of the Arab Society of Nuclear Sciences & Applications since 1970.
- Member of the International Society of Optical Engineering SPIE, USA since Sept. 1991.
- Member of the American Optical Society OSA since Jan. 1991.
- Member of the Laser and Electroptical Society LEOS, since Jan. 1993.
- Member of the American Physical Society APS Sept. 1995.
- Member of the European Photo Biological Society Euro. Ph. Bio since April 1997
- Elected member of the French Society of Physics SFP since Oct. 1998-2000.
- Member of the Bio-optical Society BIOS since Jan. 1993.

- Member of the American Society of Cell Biology ASCB since Dec. 1999.
- Member of the Third World Organization of Women Scientists TWOWS since Jan. 1993.
- Member of the American Association for Advancement of Science AAAS since Jan. 2000.

Experience in Research

1) Carried out more than 80 papers published or accepted for publication in International and Local Scientific journals and conferences, given in the attached list.
2) Supervised Ph.D. Thesis;
   Nuclear and Radiation Physics : 6 awarded
   Physics of Thin Films : 5 awarded
   Laser Physics : 14 awarded

   and 1progressing, 2 cancelled for Iraqi students
3) Supervised M.Sc. Thesis;
   Nuclear and Radiation Physics : 8 awarded
   Physics of Thin Films : 5 awarded
   Laser Physics : 23awarded



- *Paul Siffert (Sif)*
  European Materials Research Society (E-MRS), Secretary
  23 Rue du Loess –
  BP 20 - 67037 Strasbourg Cedex 02 – France
  Phone: +33-(0)3 88 10 63 72
  Fax: +33-(0)3 88 10 62 93
  E-mail: emrs@phase.c-strasbourg.fr

Biography

Was born 11/11/1935 in CERNAY (FRANCE)

EDUCATION

• After having fulfilled his high school education, he entered to the University of STRASBOURG (France)

• His five years education at this University was devoted to complete his training, respectively, in PHYSICS, CHEMISTRY and FLUID MECHANICS

• He completed a Graduate Education in the field of Nuclear Physics and Nuclear Chemistry.

• In 1960 he started a THESIS work devoted to the novel SEMICONDUCTOR RADIATION DETECTORS. This thesis work was completed in 1966.

SCIENTIFIC CAREER

• 1961: He joined the French « Centre National de la Recherche Scientifique » (CNRS) where he is still active today, in the field of SEMICONDUCTOR PHYSICS AND DETECTORS and INTERACTIONS OF RADIATIONS WITH SOLID MATTER R&D.

• 1982: He is appointed Director of the Division of the Nuclear Chemistry and Physics of the Nuclear Research Center (CNR) of the French National Institute of Nuclear and High Energy Physics, and was appointed Deputy Director of the whole Center, with a staff of over 500 persons.

• 1984: He founded the Laboratory of Physics and Semiconductor Applications at the French CNRS, and acted as its Director.

SCIENTIFIC WORK

The scientific activity was essentially devoted to SEMICONDUCTOR PHYSICS and APPLICATIONS, starting 1959, an excitic period, during which many new discoveries happened.
An overview of the activities is given below:
His interest was always devoted both towards fundamental physics as well as to applications.

• FUNDAMENTAL PHYSICS

Three main domains have been especially considered:
• SOLID STATE PHYSICS, essentially SEMICONDUCTORS, with special interest to doping and impurity solubility, chemical compensation in Si/Ge and Compound Semiconductors like CdTe or CZT, defects, transport properties etc...
• INTERACTION OF ENERGETIC BEAMS (IONS, LASERS) WITH MATTER
Three areas have been deeply investigated over years:
- ENERGY LOSS MECHANISMS of heavy particles in the 1 keV to several MeV range, with special attention to the nuclear collisions;
- INTERACTIONS of strong PULSED LASER BEAMS with semiconductors: calculation of the temperature vs time, doping and dopant solubility, recrystallisation, defects etc...
- VERY HIGH POSITIVE & NEGATIVE PARTICLES in the GeV energy range with semiconductors. Several new physical effects have been discovered related to the crystalline potential, allowing trajectory bending at CERN, light emission in narrow beams difference between positive and negative charged particles...
• NUCLEAR SPECTROSCOPY: especially in the frame of the CERN-ISOLDE programme, where short lived radioisotopes fare from the stability line could be discovered and investigated through the newly appeared in house made Germanium detectors.

• APPLIED PHYSICS & INSTRUMENTATION

The results obtained in the frame of the fundamental research have opened very large fields of applications, mainly in the five following directions:

• SEMICONDUCTOR RADIATION DETECTORS: Si, Si (Li), Ge, Ge(Li), H.P.Ge, CdTe, CZT, HgI_2 radiation detectors have been largely developed: possibility to obtain wide depletion widths for beta spectrometry, the first 100 cc Ge (Li) detector, the true coaxial Ge detector have been made by P. Siffert. A large contribution to the development of CdTe and related material based detectors has also to be mentioned.

• CRYSTAL GROWTH and CHARACTERIZATION: several decades have been spent to understand and develop the growth of semi-insulating binary CdTe and ternary Cd, Zn, Te and to study to chemical single or multiple dopant compensation by Czochralski, Bridgmann, THM, solvent methods. HgI_2 was investigated too by vapour phase transport in great detail.

• ION IMPLANTATION: in the early sixty it appeared that this would be an interesting method for the controlled doping of semiconductors. The first implanter laboratory was built at that time.

The defect annealing has been investigated both by conventionnal thermal heating, rapid thermal processing as well as by laser annealing.

• SOLAR CELLS: from the nuclear radiation detectors to photovoltaïc cells there is only a difference in wavelength; in the early 70's the CNRS has pushed the team to investigate the capabilities of our experimental procedures to develop high efficiency solar cells. In the frame of this programme was developed an intense molecular beam ion implanter with a 4'' diameter ion source as well as various rapid thermal processes for both annealing or/and deposition of films by photo induced CVD.

• INSTRUMENTATION: the knowledge of both the radiation detectors as well as the electronics gave the possibility to develop different nuclear medicine based instruments, like a real time heart imaging or specific probes for cancer detection. A large series of scientific instruments was developed too, as well as the replacement of G.M. based personal dosimeter by silicon based devices with adequate filters. The concept developed by Siffert P. is now used worldwide.

EUROPEAN ACTIVITIES

• Founder and First President of the « EUROPEAN MATERIALS RESEARCH SOCIETY » E-MRS in 1983 with the help of both the Council of Europe and the European Commission, in order to bring closer together researchers and engineers from both public and private sector working in the field of ADVANCED MATERIALS.
• Since 1983 Secretary General of E-MRS, the president changing in a yearly term.

• Founder and main actor in the 24 European Thematic NETWORKS, including over 200 laboratories and more than 1.500 researchers from the 15 European countries active in the field of Advanced Materials. This concept of NETWORKS launching in the mid 85, has been extended and is now an integrated part of the European Framework Programmes.
• Main organiser of the largest European Conference dealing with Advanced Materials in Europe, especially functional materials. Approximatively 15 symposia running in parallel attract over 1.500 scientists from nearly 50 countries fro a week in Strasbourg. Over 110 books dealing with advanced materials have already been published (Elsevier).
• Organiser of the first East - West Conference with exhibition, in strong collaboration of the Academy of Sciences from both Russia and Ukraine and the research ministers of these countries in 1992.
• Organiser of the Advanced Materials Conference in St. Petersburg in 1993 with the Russian Academy of Sciences. At this conference was decided the closer integration of both Russia and Ukraine into the international structures dealing with advanced materials (IUMRS).
• French (CNRS) representative in the European structure dealing with Solar Energy (headquarters Leuven).
• Participation to many European contracts as coodinator or partner in the field of functional materials or photovoltaïc solar cells.
• Participation to various committees at the European Community in the field of materials, renewable energy and international cooperation.

INTERNATIONAL CAREER

• Founding member of the INTERNATIONAL UNION OF MATERIALS RESEARCH SOCIETIES (IUMRS). President elected (till 1995). IUMRS incorporates Material Research Societies from over the world, the headquarters are in Evanston (USA) and the members are covering the following geographical areas: USA, Mexico, Argentina, Brazil, Europe, Russia, China, Taiwan, India, Korea, Singapor, Japan and Australia.
• Organiser of several international conferences: Boston, San Francisco, Beijing, San Diego etc...
• Founder of the Russian MRS (St Petersburg-Novosibirsk).
• Honorary member of several scientific societies.
• Organiser of several workshops in the field of advanced materials, like the joint Chinese Academy and Europe in the field of future energy supply for the world.

EDITION

• Editor and/or reviewer of several international scientific journals in the field of advanced functional materials.
• Through the E-MRS organisation over 110 books have been published in the field of advanced materials and solar cells (Elsevier).
• Author of several sections of scientific books. Presently in preparation « 50 years silicon ».

TECHNOLOGY TRANSFER ACTIVITIES

• He has performed a pioneering work in the French CNRS by trying, in the early 80' by connecting fundamental research with the high tech industry. In this spirit, he has launched several high tech companies, like Canberra-Eurisys (current name) or Eurorad; active in the field of semiconductors, respectively silicon, germanium and the II-VI (CdTe, CZT etc...)
• Scientific adviser in the field of photovoltaïcs for the French ELF oil company.

OTHER

• Member of the scientific advisory committee in several institutions in France, Germany and Ireland.

- *Hugo Thienpont (Thi)*
  Director of Research Department Chair,
  Department of Applied Physics and
  Photonics, TONA-TW,
  Vrije Universiteit Brussel
  Pleinlaan 2 B-1050 Brussel,
  Belgium.
  Tel +32 2 6293569
  Fax+32 2 6293450
  Email: hthienpo@vub.ac.be

Biography

Hugo Thienpont was born in Ninove, Belgium in 1961. He graduated as an Electrotechnical Engineer with majors in Applied Physics in 1984 and received his PhD in Applied Sciences in 1990, both at the Vrije Universiteit Brussel (VUB). In 1993 he initiated and introduced, together with his colleagues, the pioneering Photonics Curriculum for Engineers at the VUB. In 1994 he became Professor at the Faculty of Applied Sciences, with teaching responsibilities in several compulsory photonics courses such as Photonics in Telecommunication, Hot Topics in Photonics, and Practical Training in Photonics. In 2000 he became research director of the "Department of Applied Physics and Photonics" at the VUB and coordinates the activities of 30 researchers in the field of micro-optics and micro-photonics. In 2004 he is elected chair of this department. That year, together with his colleagues from Vrije Universiteit Brussel and Universiteit Gent, he introduces the interuniversity engineering curriculum “Master in Photonics”. Meanwhile he continues his role as research director in the multidisciplinary research domain of photonics and is promoter or coordinator of many basic research and networking projects, which are financially supported by regional, national and international bodies such as the Fund for Scientific Research Vlaanderen (FWO), Institute for the Promotion of Innovation by Science and Technology in Flanders (IWT), the Belgian Federal Science Policy Office, and by the European Commission. Among these are the Flemish IWT-GBOU “Generic Technologies for Plastic Photonics”

network and the European Network of Excellence on Micro-optics "NEMO". In the latter 6th Framework Program consortium he coordinates the networking, integration and research efforts of 33 top-research groups from 13 European countries. Besides academic-oriented research projects he has managed 10 micro-photonics-related industrial projects with companies like Barco, Agfa-Gevaert, Tyco, Xeikon and Umicore; all financially supported by IWT. Hugo Thienpont authored 60 SCI-stated journal papers and more than 200 publications in international conference proceedings. He edited more than 15 conference proceedings and authored 5 chapters in books. He was invited speaker at more than 30 international conferences and is co-inventor of 5 patents. He has served as associate editor of 'Optical Engineering' and 'Opto-Electronics Review' and was guest editor of several special issues on "Optics in Computing" and on "Optical Interconnects" for Applied Optics and the IEEE Journal of Sel. Top. on Quant. Electr. He is a member of the board of the European Optical Society EOS and the IEEE-LEOS Benelux chapter, is Chair to the SPIE President's Advisory Committee on Europe, and serves in technical and scientific program committees of photonics-related conferences, organized by international societies like SPIE, IEEE, OSA, EOS and ICO. In particular he organized and chaired, e.g. the ICO/EOS topical meeting on "Optics in Computing '98", the SPIE conferences on "Critical Technologies for the Future of Computing" and "VCSELs and Optical Interconnects", and the "Optical Switching and Interconnects" international conferences at the IEEE LEOS Annual Meetings. He is the general chair of the SPIE "Photonics Europe" world-conference in Strasbourg in 2004, and of the SPIE "International Congress on Optics and Optoelectronics" in Warsaw in 2005. In 1999 he received the International Commission for Optics Prize ICO'99 and the Ernst Abbe medal from Carl Zeiss for "his noteworthy contributions in the field of photonics and parallel micro-optics". From 2002 onward he has served on a regular basis as an evaluator and a reviewer for the European Commission. In 2003 he was awarded the title of "IEEE LEOS distinguished lecturer" for serving as international lecturer from 2001-2003 on the theme "Optical Interconnects to Silicon Chips". Prof. Hugo Thienpont is a member of SPIE, EOS, IEEE-LEOS and the OSA.

- *Masahiko Yamamoto (Yam)*
  Div. Chair, Materials and Manufacturing Science
  Graduate School of Engineering,
  Osaka University
  Yamadaoka, Suita, Osaka 565-0871,
  Japan.
  Tel: +81-6-6879-7486, Fax: +81-6-6879-7487
  E-mail: yamamoto@mat.eng.osaka-u.ac.jp

Biography

Professor of Materials Science and Engineering

Education

B. Eng.: Metallurgy, March 1966, Osaka University, Osaka, Japan
M. S.: Metallurgy, March 1968, Osaka University, Osaka, Japan
Ph. D: Materials Science and Engineering, February 1977, Osaka University, Osaka, Japan

Positions

1968- Research Associate, Osaka University
1978-80 Visiting Scientist, Cornell University (USA)
1982 Visiting Assistant Professor, Cornell University (USA)
1987 Associate Professor, Osaka University
1969 Professor, Osaka University
1994-95, 1999-2000, 2003-2004
Department Chair, Materials Science & Engineering, Osaka University
2003-2004 Division Chair, Mechanics, Materials and Manufacturing Science, Osaka University
2004- Division Chair, Materials and Manufacturing Science, Osaka University

Membership in Professional Societies

Japan Institute of Metals (Director, 2004-2006)
Magnetic Society of Japan (Board Member, 2003-2007)
Japan Society of Applied Physics (Committee Chair Member, 2001-2005)
Iron and Steel Institute of Japan (Board Member, 2005-2007)
Physical Society of Japan (Member)
Material Research Society (USA) (Member)
American Vacuum Society (USA) (Member)
International Field Emission Society (Vice-President, 1993-1995)

Opening Ceremony

- **Prof. Dr. Gamal A. Ata,**
  Head of Physics Department, Assuit University.

- **Prof. Dr. Kamal Abd El-Hady**,
  Chairman of Eg-MRS.

- **Prof. Dr. Hanns-Ulrich Habermeier,**
  Workshop International Organize

- **Prof. Dr. Hassan Talaat,**
  Chairman of Workshop.

- **Prof. Dr. Mohamed Z. Yousef,**
  Dean of Faculty of Science, Assuit University.

- **Prof. Dr. Abd El-Mateen Mousa,**
  President of Assuit University.

Time Table

	09:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	
Sunday **Mar. 06**	Cairo Central Railway (Ramsees) Station: **Gathering 20:00** — **Departure to Qena 20:45** (Train 976)											
Monday **Mar. 07**	Registration	Opening Cere-mony	**Keynote Lecture** (Hab)	**IUMRS** (Sif)	**Break**	**L 1** (Hag)	**L 2** (Ald)		**Excursion to Dandara Temple**			**Folklore Show, Dinner & Departure to Luxor**
Tuesday **Mar. 08**	**L 3** (Dut)	**L 4** (Ish)	**Bre**	**L 5** (Mic)	**L 6** (Hag)	**Lunch**		Paper Session A1 + B1	**Break**	Paper Session A2 + B2		**Dinner**
Wednesday **Mar. 09**	**Excursion to West- and East-bank**							**L 7** (Thi)	**L 8** (Asa)	Paper Session A3 + B3		
Thursday **Mar. 10**	**L 9** (Ald)	**L10** (Kar)	**ak**	**L11** (Dut)	**L12** (Ish)			**L13** (Nad)	**L14** (Yam)	Closing Cere-mony		Departure to Cairo

General Information

- Breakfast will be served **from** 7:00 **to** 8:15.
- Posters: Presented **from** 11:00 on Tuesday

  to 13:30 on Thursday.
- Social Activities:

 # Excursion on Monday (March 7)**:**
- **Qena:** "Dandara Temple".

 # Folklore Show on Monday (March 7).

 # Folklore Show on Tuesday (March 8).

 # Excursion on Wednesday (March 9)**:**
- **West bank:** "Hatshepsut Temple", "Vally of The Kings" and "Memnon Clossi".
- **East Bank:** "Karnak Temple".
- **Sound & Light Show:** at Karnak Temple.

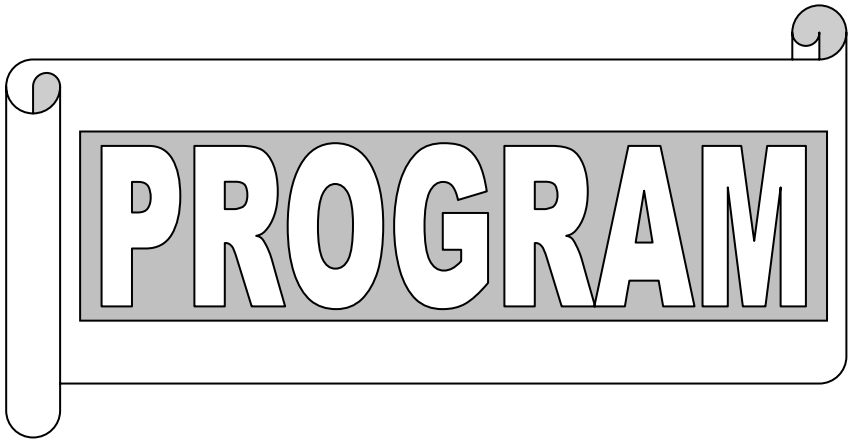
- Tour (Optional):

On Sunday (March 06) **for** Historical Cairo Sites:

 # Program:
1- Visits with Entrance fees: Egyptian Museum, Panorama of Salah El-Dien Citadel (by-pass) and Giza Pyramids.
2- **Lunch**.
3- English Speaker Tour **Guide.**
4- All **Transfers** inside Cairo.

 # Price:

Group less than 4 persons : 60 USD.
Group of 4 - 5 persons : 50 USD.
Group more than 5 persons: 40 USD.


PROGRAM

Monday, Mar. 7

10:00 - 10:30: Opening Ceremony)

10:30 - 11:30: Keynote Lecture) Nanoscale Physics.
Hanns-Ulrich Habermeier (Hab)

11:30 - 12:00: A Presentation from IUMRS)
I.U.M.R.S: An International Materials Community Initiative.
Paul Siffert (Sif)

12:30 -13:30: L 1) The Femtosecond Metal-Insulator Transition in Nanostructured Vanadium Dioxide.
Richard F. Haglund, Jr.(Hag)

13:30 -14:30: L 2) Micro- and Nano-Antennas for Light Detection.
Javier Alda (Ald)

Tuesday, Nov. 8

09:00 -10:00: L 3) Modulation Doped Lasers and Modulators.
Niloy K. Dutta (Dut)

10:00 -11:00: L 04) Self-similar Dislocation Network in Degraded ZnMgSSe-based Laser Diodes and Uniting Bottom-up Structures with Top-down Systems.
Akira Ishibashi (Ish)

11:30 - 12:30: L 05) High-Power Semiconductor Lasers.
Rainer Michalzik (Mic)

12:30 - 13:30: L 06) A New Paradigm for Deposition of Organic Thin Films: Resonant Infrared Pulsed Laser Deposition.
Richard F. Haglund, Jr.(Hag)

15:00 - 17:00: Paper Session A1 + B1

17:30 - 19:30: Paper Session A2 + B2

Wednesday, Mar. 9

15:00 - 16:00: L 07): Inter- and Intra-chip Photonic Interconnects Using Low-cost Plastic Micro-optical Components and High Density VCSEL Arrays.
Hugo Thienpont (Thi)

16:00 - 17:00: L 08): Photonic Crystal- and Quantum Dot-Technologies - Application to Ultra-Fast All-Optical Switch -
Kiyoshi Asakawa (Asa)

17:30 -19:30: Paper Session A3 + B3

Thursday, Mar. 10

09:00 -10:00: L 9) Principal Component Analysis of Results Obtained from Finite-Difference in the Time-Domain Algorithms.
Javier Alda (Ald)

10:00 -11:00: L10) Two-dimensional Photonic Crystals as Perspective Materials of Modern Nanoelectronics.
Lyudmyla Karachevtseva (Kar)

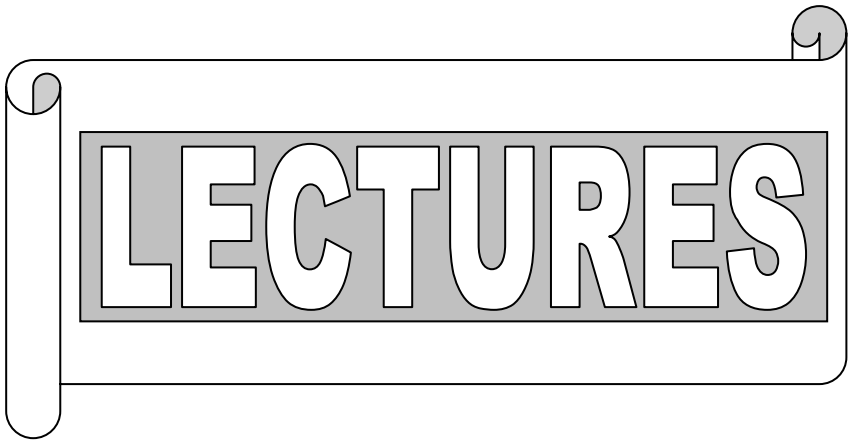
11:30 -12:30: L 11) InGaAs Semiconductor Laser.
Niloy K. Dutta (Dut)

12:30 -13:30: L 12) Physics of Enabling High Cleanliness with Compact Connected Box-Units System.
Akira Ishibashi (Ish)

15:00 -15:45: L13) Nanotechnology.
Lotfia El-Nady (Nad)

15:45 -16:30: L14) New Trend in Materials Design and Devices Based on Nano-Magnetism.
Masahiko Yamamoto (Yam)

16:30-17:00: Closing Ceremony


LECTURES

Keynote Lecture

Physics at the Nanoscale

Hanns-Ulrich Habermeier

Max-Planck-Institut, Stuttgart, Germany
E-mail: huh@fkf.mpg.de

Reducing the dimensions of a solid state material below 100nm causes a size dependent change of its properties. In this review the governing physical principles for this property change is discussed. The density of states, e.g., changes from a parabolic energy dependence in 3D to a step-like function in 2D,a delta-function-type in 1D and a discrete spectrum in zero dimensions which is realized in quantum dots. Another principle is the continuous change of the relation between surface and volume for reduced dimensions giving rise to surface dominated physical properties for small clusters. Several examples ranging from pecularities in transport properties of metals [quantum localization] and semiconductors [quantum Hall effect] to magnetic properties of nobel metals and chemical aspects such as wetting/dewetting in the "Lotus Effect" are taken to demonstrate the widespread importance of this field.

In a second chapter the technological challenges are discussed necessary to accomplish the fabrication of nanoscale materials. Here, the recent developments in the top-down approach [lithography and etching] as well as the bottom-up approach with self organisation and single atom manipulation.

A Presentation from IUMRS

I.U.M.R.S: An International Materials Community Initiative

P. SIFFERT

European Materials Research Society (E-MRS), Secretary
23 Rue du Loess – BP 20 - 67037 Strasbourg Cedex 02 – France
E-mail: emrs@phase.c-strasbourg.fr

Over the last decades, metallurgy has progressively changed, giving rise to a new field in science: materials, inspite of the complexity of the technical world, it is a matter of fact nowadays, materials research has become an effective science field, source of basic innovation. Progressively, a materials community was born, with the need of closer collaboration among the actors. his was the seed of the first Materials Research Society (MRS) founded in the 70' in USA, followed early 80' buy the European MRS (E-MRS). Today this structure covers nearly the world, through the International Union of Materials Research Societies (IUMRS). This presentation will include the goals and objectives of this Union, and strengthen the need of International closer cooperation, especially to solve major issues.

L 1

The Femtosecond Metal-Insulator Transition in Nanostructured Vanadium Dioxide[1]

Richard F. Haglund, Jr.

Department of Physics and Astronomy
Vanderbilt University, Nashville TN 37235 U.S.A.
http://sitemason.vanderbilt.edu/physics/aopg/home

Since its discovery in 1959, the metal-insulator transition in vanadium dioxide has aroused intense interest. Vanadium dioxide experiences a structural phase transition from a monoclinic to a tetragonal (rutile) phase at a temperature of 340K; as a consequence of this change in structure, the conduction-band electron concentration changes by 10^5. This change in electronic properties also strongly affects the optical properties of VO_2, leading to potential applications as diverse as "smart" windows, optical limiters for protection from laser beams, and non-volatile memories.

In 2002, we provided the first experimental confirmation that the phase transition temperature has a strong dependence on size at nanometer length scales, a change that can be explained using the Turnbull model of a martensitic transition. Since then, we have shown that the transition temperature of VO_2 nanospheres and nanorods be altered even more substantially by doping.

[1] Work supported by the National Science Foundation and the U. S. Department of Energy, and carried out in collaboration with René Lopez, Jae Suh, Eugene Donev and Leonard Feldman (Vanderbilt); Lynn Boatner and Tony Haynes (Oak Ridge National Laboratory); and Matteo Rini, Andrea Cavalleri and Robert Schoenlein of the Lawrence Berkeley National Laboratory.

Nanostructured VO_2 can be configured to provide a temperature-dependent reflective surface, and has a third-order nonlinearity substantially larger per unit volume than the bulk material. Coupled with the fact that the phase transition is extraordinarily fast — the metallic phase can be switched "on" in less than 200 fs —these properties give nanostructured VO_2 extraordinary applications potential.

In this talk, I will describe the synthesis of nanoscale VO_2 by ion implantation and pulsed laser deposition and the characterization of the material by standard techniques (*e.g.*, Rutherford backscattering, X-ray diffraction, electron microscopy, ultrafast laser spectroscopy). I will review the materials physics that underlies the phase transition, and describe the combination of electronic correlations and lattice instabilities that are believed to account for it. The talk will conclude with recent unpublished results that show how nanostructured VO_2 can help to unravel the anomalously large optical transmission of visible light through an array of subwavelength apertures.

L 2

Micro- and Nano-Antennas for Light Detection

Javier Alda, José M. Rico-García[1)], José M. López-Alonso[1)], G. Boreman[2)]

1) Optics Department. University Complutense of Madrid.
Av. Arcos de Jalón s/n. 28037 Madrid. Spain.
2) CREOL / School of Optics. University of Central Florida.
4000 Central Florida Blvd. Orlando. FL 32816-2700. USA.
E-mail: j.alda@fis.ucm.es

Antenna-coupled optical detectors, also named as optical antennas, are being developed as detection devices with micro- and nano-scale features for their use in the millimetre, infrared, and visible spectral range. They are optical components that couple the electromagnetic radiation in the visible and infrared wavelengths in the same way that radioelectric antennas do at the corresponding wavelengths. Optical antennas shows polarization dependence, tuneability, and rapid time response. They also can be considered as point detectors and directionally sensitive elements. So far, these detectors have been operated in the mid-infrared with positive results in the visible. The measurement and characterization of optical antennas requires the use of experimental set-up with nanometric resolution. On the other hand, a computation simulation of the interaction between the material structures and the incoming electromagnetic radiation is needed to explore alternative designs of practical devices. In this contribution we will present the concept of optical and infrared antennas, and some experimental results of their performance, along with the experimental set-up arranged for their characterization in the visible.

L 3

Modulation Doped Lasers and Modulators

N. K. Dutta

Department of Physics, University of Connecticut, Storrs, CT, USA
E-mail: niloy@engr.uconn.edu

The properties of InGaAsP modulation doped multi-quantum well lasers, such as, gain, modulation response and RIN have been studied. The results show that the relaxation oscillation frequency f_r in MD-MQW lasers can be enhanced by more than a factor of 2 over that of undoped MQW lasers using p-type modulation doping. Also α-factor can be reduced to 1/5 of the value for undoped MQW laser by p-type modulation doping and the relative intensity noise (RIN) is reduced by a factor of > 10 dB compared to that for undoped MQW lasers. The improvements in these values in MD-MQW lasers is due to an asymmetry in the occupation of conduction band and valence band states.

Distributed feedback InGaAsP multiquantum well lasers with doped barrier layers and undoped active layers (modulation doping) have been fabricated on n-InP substrate and their characteristics have been measured. These lasers, with high reflectivity coating on one facet and low reflectivity coating on the output facet, have threshold current, slope efficiency, small signal bandwidth and relative intensity noise of 10 mA , 0.3 mW/mA, 8 GHz and –148 dB/Hz respectively.

Modulation doped lasers integrated with electroabsorption modulators have been grown and processed. The RIN characteristics of packaged devices have been measured, the measured values are in the – 160 dB/Hz to -165 dB/Hz range at low frequencies (< 1 GHz). These values are considerably smaller than typically observed for regular multiquantum well DFB lasers.

L 4

Self-similar Dislocation Network in Degraded ZnMgSSe-based Laser Diodes and Uniting Bottom-up Structures with Top-down Systems

Akira Ishibashi

Laboratory of Quantum Electronics,
Research Institute for Electronic Science, Hokkaido University,
Sapporo 060-0812, Japan
E-mail : I-Akira@es.hokudai.ac.jp

In the degraded active layer of a ZnMgSSe-based laser diode (LD), i.e., one of top-down devices, are seen dislocation networks consisting of many self-similar, nested V-shaped structures with different sizes. The dislocation network starts from stacking faults and is found to have a fractal dimension ~ 1.55 indicating the degradation of LD is one example of the self-organized criticality that is seen universally in systems having energy in-flow and spatio-temporal dissipation. The present bottom-up system of the dislocations, being caused by spatio-temporal dissipation in LD operation, is a fully solid state system, and we can set the bottom-up structure of the fractal dislocation networks to grow at arbitrary positions in the top-down structures of LDs by designing the position of the stacking faults and can control the size of the bottom-up structure by the amount of the electron-hole injection in the pn-junction of the diodes.

Thus, the first step in bridging over the gap between the top-down systems and the bottom-up systems is demonstrated to be possible. The bottom-up system, as typically seen in a set of quantum dots or bio-related systems, generally has (pseudo-)isotropy after a continuous development in time-domain, while the

top-down system, as seen in Si-LSI, has, in general, an anisotropic structure accompanied by a series of sporadic changes caused by the processing. Thus for the second step in uniting those two systems, use of an intermediate structure having spatial anisotropy brought by continuous growth in time-domain would serve as a platform to combine the bottom-up and top-down systems, and we propose to use two thin slices of alternating metal/insulator multilayers (Double Nano-*Baumkuchen*: DNB).

L 5

High-Power Semiconductor Lasers

Rainer Michalzik

University of Ulm, Optoelectronics Dept., D-89069 Ulm, Germany
http://www-opto.e-technik.uni-ulm.de/

Optimizing semiconductor lasers for high optical output power, high conversion efficiency, and high beam quality continues to be a hot research topic. Applications for these sources are as diverse as pumping of optical amplifiers for telecommunications or solid-state lasers, direct material processing, surface treatment, infrared illumination, optical metrology, free-space data transmission, printing, laser projection displays, as well as medical therapy, dermatological treatments, or hair removal.

This lecture will deal with three kinds of semiconductor laser sources, namely regular, both single- and multi-lateral mode edge-emitting diode lasers and laser bars, optically pumped vertical external cavity surface-emitting lasers (VECSELs), and large-area vertical-cavity surface-emitting lasers (VCSELs) including monolithic two-dimensional arrays. Some attention will be paid to the issues of obtaining high efficiency of conversion from electrical to optical power and high radiance, i.e. high emitted power per unit area and unit solid angle. For the case of edge-emitting single-mode lasers, the state-of-the-art of 980 and 1480 nm pump lasers for erbium-doped optical amplifiers will be reviewed. In parallel, much progress has been achieved recently with laser bars consisting of multiple broad-area sources. The novel VECSEL is a highly attractive device concept for the scalable generation of laser beams with highest radiance. Its design and operation characteristics will be discussed. This laser is particularly well suited for high-power visible light generation via frequency doubling using nonlinear crystals. The third laser source, namely

the VCSEL, is known for many years already as an ideal low-power transmitter of high-speed digital bit streams in data communications over silica multimode fibers. On the other hand, large active area VCSELs or parallel-driven two-dimensional laser arrays are able to emit output powers in the watt regime. Due to favorable beam properties and low-cost fabrication capability, these devices are well suited for a number of high-volume applications. Latest results in this field will also be reported.

L 6

A New Paradigm for Deposition of Organic Thin Films: Resonant Infrared Pulsed Laser Deposition[2]

Richard F. Haglund, Jr.

Department of Physics and Astronomy
Vanderbilt University, Nashville TN 37235 U.S.A.
http://sitemason.vanderbilt.edu/physics/aopg/home

Pulsed laser deposition (PLD) using ultraviolet (UV) excimer lasers played a pivotal role in the successful synthesis of high-temperature superconducting oxide films in the late 1980s, and has become one of the standard techniques for prototyping a wide variety of inorganic films, especially oxides and complex semiconductors. However, the UV-PLD technique has been notably unsuccessful when applied to organic thin-film deposition, primarily because UV laser excitation of most organic molecules leads to destructive photochemical reactions.

During the past three years, we have investigated a new paradigm for deposition of organic thin films based on selective vibrational excitation of infrared-active modes in organics. The experiments have been carried out primarily using a picosecond-pulse, tunable mid-infrared (IR) free-electron laser; however, some comparisons have been made with fixed-frequency infrared lasers as well. We have demonstrated that the excitation of weakly resonant IR modes can lead to efficient, essentially non-destructive transfer of organic molecules, such as poly(ethylene glycol),

[2] Work supported by the Air Force Office of Scientific Research, the Naval Research Laboratory and the U. S. Department of Energy, and carried out in collaboration with Michelle Baltz-Knorr, Stephen Johnson, Michael Papantonakis and Kenneth Schriver (Vanderbilt).

poly(tetrafluoroethylene), and functionalized polysiloxanes. A variation on the technique in which the molecule is embedded in water-ice matrix makes it possible to deposit intact supercoiled DNA and large proteins. The mechanism that appears to operate involves multiple-photon vibrational excitations in the electronic ground state, followed by bond-breaking and ejection of molecules and liquid clusters from the surface.

In this talk, I will describe the application of this technique to the deposition of thin organic films suitable for applications as chemo- and bio-sensors, coatings for time-release drug-delivery, and electronic devices. The results indicate that IR-PLD may be especially useful for applications with micro-electro-mechanical structures (MEMS) and micro-optical-electro-mechanical structures (MOEMS) that are coming into widespread use in the electronics, photonics and sensor sectors.

L 7

Inter- and Intra-chip Photonic Interconnects Using Low-cost Plastic Micro-optical Components and High Density VCSEL Arrays

Hugo Thienpont (Thi)

Department of Applied Physics and Photonics, TONA-TW,
Vrije Universiteit Brusse, Pleinlaan 2 B-1050 Brussel, Belgium.
Email: hthienpo@vub.ac.be

We present and discuss different approaches and technologies for optical interconnects to Silicon chips with a focus on low-cost, chip-compatible, three-dimensional free-space plastic micro-optical interconnect modules.

Photonic technologies have been widely accepted as a way to alleviate bottlenecks in platform-to-platform, machine-to-machine and board-to-board interconnections. Recent breakthroughs in the fabrication of spatial arrays of optoelectronic emitters and detectors and their heterogeneous integration with Si-CMOS electronic chips now also encourage the use of optics as an electronic wire replacing technology at the inter- and intra- Multi-Chip-Module interconnection level.

The main objective for introducing two dimensional photonic pin-outs at this level of the interconnection hierarchy aims at relaxing the bandwidth limitations between these electronic processing modules primarily imposed by fundamental electrical signal propagation issues and the limited number of electrical chip pin-outs. VLSI-photonic interconnection technologies enable this high-aggregate-bandwidth low-latency photonic data transfer over short distances. It can for example be realised through the use of two dimensional arrays of low-threshold Vertical Cavity Surface Emitting Lasers (VCSELs) and high-sensitivity photo-detectors, flip-

chip mounted on CMOS circuitry and optically interconnected by beam-shaping and beam-delivering micro-optical modules.
One of the challenges to make this technology practical and viable is the manufacturing of low-cost, chip-scale-compatible, high-precision three-dimensional micro-optical pathway blocks that integrate all the micro-opto-mechanical components necessary to seamlessly and efficiently interface these opto-electronic surface-normal transmitters and receivers.
In the first part of our presentation we review the state-of-the art of photonic interconnects to silicon chips and highlight opto-electronic emitter and receiver arrays, heterogeneous integration technologies, and free-space and guided-wave optical pathway blocks.

In a second part of our talk we present our approach to chip-scale optical interconnects. We focus on design, fabrication and characterization issues of multi-channel free-space optical interconnection modules and demonstrate a prototype component for fire-hose data capacity well into the Tbit/s.cm^2 regime. Finally we tackle cost and replication issues of these optical MEMS in semiconductor compatible optical plastics.

L 8

Photonic Crystal- and Quantum Dot-Technologies - Application to Ultra-Fast All-Optical Switch-

K. Asakawa

TARA Center, University of Tsukuba, Tennodai, Tsukuba 305-8577,
and
The Femtosecond Technology Research Association (FESTA)
5-5 Tokodai, Tsukuba 300-2635, Japan
Tel/Fax: 81-29-853-6423
E-mail: asakawa@tara.tsukuba.ac.jp

Structural control techniques of two-dimensional photonic crystals (2DPCs) are reviewed, focusing on the precise nano-fabrication of air-hole lattices and functional waveguide design in light of application to an ultra-small and ulta-fast symmetric Mach-Zehnder type all-optical switch (PC-SMZ). For a typical GaAs-based air-bridge type of 2DPC structures, transmission spectra in good agreement with calculation and low propagation loss of less than 1 dB/mm are reproducibly exhibited, while directional couplers with arbitrary and wavelength-dependent coupling strengths play important roles of practical beam splitters/couplers. Through the recent switching operation of the PC-SMZ, possibility of far advancement of the 2DPC-based integrated circuits is concluded.

This work was supported by the New Energy and Industrial Technology Development Organization (NEDO) within the framework of the Femtosecond Technology Project.

L 9

Principal Component Analysis of results obtained from Finite-Difference in the Time-Domain Algorithms

José M. López-Alonso, José M. Rico-García, Javier Alda

Optics Department. University Complutense of Madrid.
Av. Arcos de Jalón s/n. 28037 Madrid. Spain.
E-mail: j.alda@fis.ucm.es

Finite-Differences Time-Domain (FDTD) algorithms are well established tools of computational electromagnetism. Because of their practical implementation as computer codes, they are affected by many numerical artifacts and noise. In order to obtain better results we propose using Principal Component Analysis (PCA) based on multivariate statistical techniques. The PCA has been successfully used for the analysis of noise and spatial temporal structures in the analysis of a sequence of images. It allows a straightforward discrimination between the numerical noise and the actual electromagnetic variables, and the quantitative estimation of their respective contributions. Besides, the FDTD results can be filtered to clean the effect of the noise. In this contribution we will show how the method can be applied to several FDTD simulations: the propagation of a pulse in vacuum, the analysis of two-dimensional photonic crystals. In this last case, PCA has revealed hidden electromagnetic structures related to actual modes of the photonic crystal.

L10

Two-dimensional Photonic Crystals as Perspective Materials of Modern Nanoelectronics

L. A. Karachevtseva

V. Lashkariov Institute of Semiconductor Physics of NAS of Ukraine; 41 Nauki Prsp.,
Kiev-03028, Ukraine; tel.:(8-044)265-98-15, fax: (8-044)265-83-42, E-mail: lakar@isp.kiev.ua

Photonic crystals are a dynamic direction of solid state physics. The basic practical development is connected to use of transformation of electromagnetic waves spectrum (dispersive, nonlinear, tunnel characteristics of photonic structures). Today the basic researches (more than 80 %) are concentrated on the two-dimensional photonic crystals, which have functionality of three-dimensional photonic crystals and rather simple manufacturing techniques. The most effective methods of the two-dimensional photonic crystal formation are X-ray and electron beam lithography; dry, ionic-beam and electrochemical etching. Such methods allow to form structures with the sizes of air rods from 10 nm up to 10 microns. Practical researches in the field of two-dimensional photonic crystals directed, mainly, on development of the future integrated nanophotonic circuits (two-dimensional photonic crystal nanolasers with quantum wells and quantum dots; photonic waveguides, photonic fibres). Formation of structures without line of rods permits to fabricate photonic waveguides. Electromagnetic waves localize in waveguide and penetrate due to Bragg-type scattering. Formation of structures without single rod permits to fabricate cavities. Electromagnetic waves are enhanced due to localization in cavities.

The perspective material for development of two-dimensional photonic crystals is the macroporous silicon due to formation of structures with the necessary geometry, the big ratio of the cylindrical macropore depth by the diameter. Macroporous silicon structures are perspective for development of thermal receivers, photonic waveguides due to occurrence of the powerful absorption bands in the infrared spectrum range. Formation the macroporous silicon structures with nanocoatings expands its functionalities as light emitters and photodetectors.

Effects of increase in absorption of electromagnetic radiation in 2D photonic macroporous silicon were measured for wavelengths less than one optical period of macropores. Dependence of photoconductivity on a corner of the falling of the electromagnetic radiation, prevalence of absorption over reflection of light, as well as enhancement of the photoconductivity in comparison with the monocrystalline silicon testify to formation of surface waves (surface polaritons). Conformity of spectra of photoconductivity of macroporous silicon to spectra of intrinsic photoconductivity of monocrystal silicon testifies the enrichment of a macropore surface by photocarriers and formation of a surface electromagnetic wave of plasmon type. Elecrtroreflectance spectroscopy of macroporous silicon surface showed an intrinsic electric field near 10^6 V/cm. Thus, electronic gas is quantified in a surface layer of the macroporous silicon structure. Polariton frequencies in long-wave part of the macroporous silicon optical transmittance are commensurable to experimental values of the surface plasmon frequency in the 2D electronic gas on Si-SiO_2 boundary. 2D surface plasmons are distributed deeply (1 micron) in volume of a silicon matrix.

L11

InGaAs Semiconductor Laser

N. K. Dutta

Department of Physics, University of Connecticut, Storrs, CT, USA
E-mail: niloy@engr.uconn.edu

This talk will describe the current status of InGaAs high power semiconductor lasers. The laser wafers are fabricated using the InGaAs/GaAs material system and emit near 970 nm. The active region consists of multiple layers of InGaAs sandwiched between GaAs layers. The lasers have a dielectric stripe structure with suitable facet coatings for high power operation and for reducing surface recombination at the laser mirror facet. The power output is in the range of 2 to 10 W. The lasers are important for applications as pump lasers for high power fiber amplifiers and for other industrial applications. The various factors that lead to failure of these lasers and the possible causes of failure will be described. Surface emitting InGaAs lasers have also been fabricated. Phase locked operation of an array of these devices will be discussed.

L12

Physics of Enabling High Cleanliness with Compact Connected Box-Units System

Akira Ishibashi, Hideo Kaiju, and Nobuyoshi Kawaguchi

Laboratory of Quantum Electronics Research Institute for Electronic Science Hokkaido University, Sapporo, Hokkaido 060-0812, Japan
E-mail : I-Akira@es.hokudai.ac.jp

We are in need of performing cross-disciplinary experiments, especially, for uniting or unifying bottom-up systems with top-down systems through fusion of cutting edge research technologies such as semiconductor-based nanotechnologies and bio-technologies as well as flexible assembly processes. In this sense, physics of enabling clean environment in less expensive, compact, and versatile manner is getting of much importance, for many of tools and processes being commonly used in nanoscale-research facilities, such as SPM (scanning probe microscopy), electrochemical material growth, photolithography, printing-technology-based organic field effect transistors (FETs), chemical etching processes, molecular biology, tissue culture, bio-analysis, PCR(polymerase Chain Reaction), nowadays, can basically be realized in a highly compact manner.

Analysis of enabling clean environment in a connected box-units system, i.e., a system consisting of compact multiply connectable clean boxes, is made. By feedback of outlet air into the inlet of the box-unit, the steady-state airborne-particle-count in the system becomes independent of the ambient particle count and dependent little on the particle-arrest efficiency of the filter. Based on this analysis, it is demonstrated that we can realize ISO 3 (US Federal Standard 209D Class 1) cleanliness in an inexpensive compact manner with the connected box-units system, no matter how dusty

the ambient is, e.g., in a laboratory/office with airborne particle count as high as tens of millions. The multiply-connected box-units system would serve as the platform not only for nano-technologies or biotechnologies but also for fusion of them and many other cross-disciplinary research fields.

L13

Nano-Technology

Lotfya El-Nady

Physics Department, Faculty of Science, Cairo University, Egypt

Since more than hundred years ago Albert Einstein in his doctoral dissertation calculated the size of a single sugar molecule to measure about a nanometer in diameter. After these years on Einstein insight, the nanometer scale became the interest of today's agenda of research and nanotechnology may be considered as Einstein's massage conveyed to nowadays research. In this report we shall introduce the definition of fields of the nanoscience and nanotechnology and there importance in scientific research. Building and preparing small structures using nanofabrication techniques will be elaborated. Methods to detect and identify the prepared nanostructures will be surveyed. But scientists should first understand the unique physics that govern matter within this scale. The need for new law's that is not precisely classical physics or quantum physics call for a new scientific teams of researchers to explore nanophysics. The practical links of the physical and chemical properties within nanometer size is not an easy problem due to the spread of volume and the difficulty of definite description of the behavior acquired between molecules during their interaction. One may consider that the electrons in nanostructures are in a quantum one dimensional system that develops unusual optical, electrical and magnetic behavior. The age of nanofabrication is here, the age of nanoscience has dawned, but the age of nanotechnology finding practical uses of nanostructures has not really started yet. We shall speculate the future expectations of the application of nanostructure in electrical devices, computers and communications as well as thermal, chemical, mechanical and biological fields. We shall discuss the possible ways to strengthen collaboration

between scientists in order to develop local, regional and international teams of research. We shall also suggest possibilities of financial support that can enhance an immediate activation of scientific research in nanophysics and applications both theoretically and experimentally.

L14

New Trend in Materials Design and Devices Based on Nano-Magnetism

Masahiko Yamamoto

Masahiko Yamamoto*, Ryoichi Nakatani,
S. Anisul Haque and Yasushi Endo
Department of Materials Science and Engineering & Frontier Research Center, Graduate School of Engineering, Osaka University, Yamadaoka, Suita, Osaka 565-0871, Japan
Tel: +81-6-6879-7486, Fax: +81-6-6879-7487
E-mail: yamamoto@mat.eng.osaka-u.ac.jp

One hundred years have passed since the discovery of electron. The electron has two features; one is charge and the other is spin. The charge is highly utilized for these one hundred years, the 20th century, while the spin is not. I expect the 21st century will become the spin age. In order to develop it, the materials design and devices based on nano-magnetism is necessary. One of the most exiting developments is to explore the spin computer. The fundamental elements are memory, computation and transmission of the spin information. In this paper we describe device-oriented material design of the magnetic memory and the magnetic logic gate based on nano-magnetism, which are fabricated by thin films. In the magnetic memory, new types of magnetic memory cells are proposed. The magnetization processes and magnetic states are investigated as a function of the shape, size and thickness of their memory cells. The suitable memory cells are discussed. In the magnetic logic gate, NAND and NOR gates are successfully made using ferromagnetic elliptical dots. Their operations are presented. It is demonstrated that the fundamental units of the hardware of the spin computer are completed.


PAPERS

Session A1

Tuesday, March 8, 2005-02-25
(15:00 – 17:00)

Chairman

Prof. Dr. Mohamed El-Zaydia
Prof. Dr. Monir Saad El-Deen

A 1_1

Formation of Carbon Nanowires by Laser Ablation of Graphite

Lotfia El Nadi*, Magdy M. Omar, Hussein A. Moniem

Laser Laboratory, Physics Department, Faculty of Science,
Cairo University, Giza, Egypt
e-mail: lotfianadi @ hotmail.com

Carbon nanowires have been prepared by laser ablation of graphite targets using confined geometry in air. Nitrogen laser beam of wavelength 337±2nm, pulses of 15±1 ns duration and power 1 MW per pulse. Using scanning electron microscopy nonowires were shown to be formed on the stainless steel substrate surface. The formed nanowires were found to have density of 420 cm^{-2}, average length of 850±7μm and diameter of 225±20 nm. Random distribution of the formed nanowires was noticed with no specific orientation. Some of the wires seemed to be formed of closely packed nanowires forming straight parallel bundles of nanowires. The effect of substrate material was studied and indicated the importance of using metallic substrates. Results will be shown in scanning electron microscope micrographs.

A 1_2

Photoinduced Changes in As_2S_3 Thin Films

A.Abd-El Mongy

Physics department Faculty of Science, Helwan University, Cairo, Egypt

Optoelectronic, photoelectric and electrical investigations on amorphous As_2S_3 thin films prepared by thermal evaporation are carried out. An optical gap of 2.15 eV is derived from the treatment of the optical absorption data while a value of about 2.5 eV is obtained from the spectral dependence of the photoconductivity. The light-induced changes in film properties are also followed. The measured transmittance of the unexposed films peaks at 2.06 eV and shifted to 1.94 eV after prolonged (3h) exposure. Photoconductivity as well as optical gap is lowered by illumination. Metastable and transient components are observed after irradiation. Over the temperature range from 100 K < T > 325 K the dark and photoconductivity showed the semiconducting activated behavior with two different transport mechanisms in two domains of temperature. The kinetics of photoconductivity indicates that the new localized states created by illumination dominate the recombination process in a similar manner to the original states.

A 1_3

Structural Characterization of Fluorine Doped Cadmium Oxide Thin Films Deposited by Spray Pyrolysis

H. H. Afify[1], M. A. Khalef, T. A. Abdel-Halim[2],

[1]NRC Tahrir St. Dokki
[2]NMA Kattamia Rd. Maadi P.O.B 530

Fluorine-doped Cadmium Oxide (CdO:F) thin films have been deposited on glass substrates using spray pyrolysis technique at temperature T=350 °C. The concentrations of fluorine in these films were varied from 1% to 42%. X-ray diffraction pattern confirmed the polycrystalline nature of these films. The films exhibit preferential orientation along the (111) plane. At high Fluorine concentrations a binary mixture of CdO and CdF_2 is formed as confirmed by the diffraction pattern. Various structural parameters such as lattice constants, crystallite size, strain, dislocation density and stacking fault probability have been calculated. The effect of adding fluorine with different ratios on the structure of CdO was discussed.

A 1_4

Structure and Optical Properties of Chemically Deposited Lead-sulfide Thin Films

S. Mahmoud and H. Omar

Physics Division, Electron Microscope and thin Films,
National Research Center, Dokki, Cairo, Egypt

Lead-sulfide films were deposited by chemical deposition technique on glass substrate at room temperature. The advantage of the low temperature used, that the growth process is little possibility of diffusion of constituents of the depositing film into the substrate. The films are very adherent and homogeneous to the substrates. The ingot samples were prepared from the pure elements [lead and sulpher]. The composition of the samples was determined by chemical analysis. Structural analysis for the powder and thin films were studied by X-ray powder diffraction with the help of very accurate instrument and a group of software programs. The film thickness lies in the 120 nm to 600 nm range. This work presents the results, of observations, X-ray analysis of chemically prepared films, and the effect of various parameters on the film structure. Also, it is to investigate the effect of the annealing under vacuum on the structure and optical properties of the various films. The direct transmission spectrum of lead-sulfide thin films deposited on glass substrates has been measured, in the range of infra red. The thermal stability of the powder samples was studied.

A 1_5

Antimony – incorporated TiO2 thin films: Preparation, optical and electrical characteristics

W. A. Badawy, R. S. Momtaz, H.H. Afify, E. M. El- Giar

Antimony- incorporated TiO2 thin films were prepared using the spray-pyrolysis technique. The optical characteristics (percentage transmittance, refractive index, extinction coefficient) and the film thickness were investigated. The resistivity of the prepared samples was measured, and the effect of Sb concentration and film thickness on the measured parameters was discussed. The effect of Sb on the band-gap was also studied.

THE XXV CONFERENCE ON: ***Solid State Physics and Materials Science***
&
WORKSHOP ON: ***Photonic Materials and Optoelectronic Devices (II)***
6 -10 March 2005 Luxor, Upper Egypt

A 1_6

Comparison Structure and Magnetic Study of Nano-Composite Fe_2O_3: $BaTiO_3$ Prepared with Sol-Gel and Spray Pyrolysis Techniques.

H. H. Afify, I. K. Battisha and I. M. M. Moussa

National Research Center, Department of Solid Satate Physics,
Giza, Egypt.
e-mail; passtkouine55@yahoo.com

Nano-structure $BaTiO_3$ doped with **Fe_2O_3** have been prepared by two different techniques, spray pyrolysis (SP) and Sol-gel. Nano-structure pure barium titanate and doped with 30 % of Fe_2O_3 in the form of powder and thin film have been prepared by Sol-gel technique, using barium acetate ($Ba(Ac)_2$), and titanium butoxide ($Ti(C_4H_9O)_4$), as precursors. The thin films were prepared by spin coating sol-gel method. The as-grown thin films and powders were found to be amorphous, which crystallized to the tetragonal phase after synthesized at 750^{o}C in air for 30 minutes. This data was compared to the data obtained by preparing the thin film by spray pyrolysis technique using the same precursors and was found nearly the same. The crystallite sizes of powder sample prepared by Sol-gel technique and the thin film prepared by both techniques SP and Sol-gel, was found to be equal to = 5.5, 14 and 10 nm, respectively for doped materials. The XRD data were confirmed by transmission electron microscope TEM. The dielectric constant and loss tanget (tan δ) were measured for the powders and thin films prepared by Sol-gel technique. Their values measured at 1 KHz were found to be equal to (1135, 0.012) and (370, 0.015), respectively**.** The magnetic properties were compared.

THE XXV CONFERENCE ON: ***Solid State Physics and Materials Science***
&
WORKSHOP ON: ***Photonic Materials and Optoelectronic Devices (II)***
6 -10 March 2005 Luxor, Upper Egypt

A 1_7

Electrical Properties and Crystallization Kinetics of a-Sb_x S_{100-x} Films

El-Sayed M. Farag

Basic Science of Engineering Dept., Faculty of Engineering,
Shebin El-Kom,Minufiya University, Egypt.

E-mail: awsymkh@yahoo.com Fax: 048/235695

Amorphous Sb_xS_{100--x} films have been prepared by thermal evaporation technique. Electrical conductivity assessment has been carried out on these films in the temperature range 300-450K. The temperature dependence of the electrical conductivity for all compositions has been recorded and discussed. The change in the electrical conductivity with time was recorded at different isotherms between the amorphous-crystalline transition. The kinetic parameters determined have made it possible to discuss the growth of the crystals in two or three dimensions.

A 1_8

Experimental Testing of A Shallow Solar Pond With Continuous Heat Extraction

M. R. I. Ramadan, A. A. El-Sebaii, S. Aboul-Enein, A. M. Khallaf

Department of Physics, Faculty of Science, Tanta University, Tanta, Egypt

The thermal performance of a shallow solar pond (SSP) under the batch and open cycle modes of heat extraction has been investigated experimentally. Experiments have been performed during the summer season of 2001 under different operational conditions for the two modes of heat extraction. The pond performance is investigated in terms of the heat loss coefficients and the rates of energy losses and energy collected. It is found that using an additional glass cover reduces the top U_t and total U_l loss coefficients by 54% and 44%, respectively. The highest value of the rate of energy collected $\dot{Q}_{coll.}$ of 644 W has been achieved when the pond is used with double glass cover and an outer mirror. Further, the tap water is used as a fluid flowing through a heat exchanger (HE), welded to the pond absorber plate, to extract the heat under the open cycle mode. The outlet temperature of the HE's fluid T_{fo} is found to decrease with the increase of the mass flow rate $\dot{m}_f$. The maximum values of T_{fo} are found to be 55.5, 46.5 and 43.5°C when $\dot{m}_f$ equals 0.00054, 0.0030 and 0.00798 kg/s, respectively. Comparisons between the two modes of heat extraction are performed based on the efficiency and the successive operation of the pond. The long-term performance of the pond under the best operational conditions has been investigated by computer simulation for a whole year. It is inferred that the present SSP can be used as a source for the warm water required for domestic applications under climatic conditions similar to Tanta city (latitude $30^\circ\ 47'$).

A 1_9

Conduction Mechanism in Amorphous Thermally Evaporated $As_{20}Se_{80-X}Tl_X$ Films

M. M. El-Nahass*, M. Dongol**, M. Abou-zied**
and A. El-Denglawey**

** Phys. Dept. Fac. Of Edu. Ain Shams Univ., Cairo, Egypt.*
*** Phys. Dept. Fac. Of Sci. South Valley Univ., Qena, Egypt.*

The effect of Tl addition on the electrical properties of $As_{20}Se_{80-X}Tl_X$ chalcogenide semicoductors films was studied in homogenours glass forming region where x from 5% up to 35% at.% The investigation was accomplished via two temperature ranges the low temperature range (173-300 K) and the high temperature range (300373 K). Tl addition to As-Se-Tl alloys tends to decrease both glass transition, melting temperature and activation energy where it decreases from 0.88 up to 0.64 eV and attributed to the shift of Fermi level up ward against the valence band. The conductivity increases as a function of Tl-content. At low temperature range Mott's parameters were determined where density of localised states $N(E_F)$ values was found to be increase as Tl-content increase which reflects that the defect states near the Fermi level increases with the addition of Tl. Also the degree of disorder (To) increases as the concentration of Tl increase.

A 1_{10}

Study of Structural and Optical Properties for the Ternary System Zn Se_x Te_{1-x} Films

Afaf A. Mohamed

Physics Dep., Faculty of Science, Assiut University, Assiut, Egypt.

The structural and optical properties of solid solutions of the turnery system Zn Se_xTe_{1-x} with molar reaction 0.1, 0.4, 0.3, 0.6 &0.9 in their film from of different thickness were investigated. The anomalous photovoltoic effect generated in angle Zn $Se_{0.9}$ $Te_{0.1}$ thin films was ascribed. The Zn Se_x Te_{1-x} solid solutions in powder form (0.1 x 0.9) indicated polycrystalline nature belonging to face centered cubic phase. The crystallites size decreases gradually with increasing the molar fraction. The compositional dependence of the optical constants, the refractive index n, and the observation index k, of the Zn Se_x Te_{1-x} thin film with (0.1 x 0.9) were determined in spectral range of 400-2500 nm. The high frequency dielectro constant also was determined. The value of the energy gap including the spin-orbit splitting E_g+4 showed variation with molar fraction and its mean values is equal to 0.424 ev.

Session B1

Tuesday, March 8, 2005-02-25
(15:00 – 17:00)

Chairman

Prof. Dr. Tharwat El-Sherbini
Prof. Dr. Said Mazen

B 1_1

The Effect of Lanthanum and Calcium Deficiencies on the Physical Properties of the Lanthanum Series $La_{0.5-x}Ca_{0.5}MnO_3$ and $La_{0.5}Ca_{0.5-x}MnO_3$.

Abdelwaheb Cheikhrouhou

Faculté des Sciences de Sfax B.P. 802, 3018 Sfax-TUNISIA.

The lanthanum and the calcium deficiencies have completely different effects on the physical properties (structure, magnetic, electrical and magneto-transport).

The second one will be on the study of the RE2Fe17 intermetallic compounds (RE is a rare-earth element) with several substitutions in RE, in Fe and also insertion of nitrogen and the effect of these substitutions on the physical properties (Curie temperature, saturated magnetization,...).

B 1_2

Magnetic Properties of RCo$_9$Si$_4$ Compounds (R = La, Y and Ce)

M. El-Hagary[1,2], H. Michor[2], S.Özcan[2], E. Bauer[2], R. Grössinger[2], M. Reissner[2], P. Rogl[3], G. Giester[4], D. Eckert[5], K.H. Müller[5], P. Kerschl[5], S. Khmelersky[6], P.Mohn[6], and G. Hilscher[2]

[1]Helwan University, Faculty of Science, Physics Department, Helwan, Cairo, Egypt
[2]Institut für Festkörperphysik, TU Wien, A-1040 Wien, Austria
[3]Institut für Physikalishe Chemie, Universität Wien, A-1090 Wien, Austria
[4]Institut für Kristallographie, Universität Wien, A-1090 Wien, Austria
[5]IFW Dresden, institut für Metallische Werkstoffe, D-011171 Dresden, Germany
[6]Center for Computational Material Science, TU Wien, A-1040 Wien, Austria

The ternary compounds. RCo$_9$Si$_4$ (La, Y and Ce) have been studied by means of specific heat, magnetization, and resistivity measurements. Single crystal X-ray Rietveld refinements at room temperature reveal a fully ordered distribution of R (Y, La and Ce), Co and Si atoms within the tetragonal space group I4/mcm isostructural with RCo$_9$Si$_4$ The smaller lattice consistent of CeCo$_9$Si$_4$ in comparison with the trend established by other RCo$_9$Si$_4$ is indicative for intermediate valence of cerium. While RCo$_9$Si$_4$ with R = Pr, ... and Tb show ferromagnetism, LaCo$_9$Si$_4$ exhibits itinerant electron metamagnetism with an induced moment of about 1 μ_B/f.u. above 6 T, whereas YCo$_9$Si$_4$ exhibits a spontaneous magnetisation $M_0 \sim 12$ Am^2/kg at 2 K which corresponds to an ordered moment of about 1.6 μ_B/f.u. indicating weak iterant ferromagnetism. Furthermore, CeCo$_9$Si$_4$ remains paramagnetic even in external fields as large as 40 T, though its electronic specific heat coefficient. (γ. = 190 mJ/mol K^2) is of similar magnitude as that of metamagnetic LaCo$_9$Si$_4$ and weakly ferromagnetic YCo$_9$Si$_4$.

B 1_3

Magnetic Pinning of Flux Lines by Magnetic Domains in Heterostructures of Cuprates and Manganites

S. Soltan[1,3], J. Albrecht[(1,2)], and H.U. Habermeier [(1)]

[1] Max--Planck--Institut fuer Festkoerperforschung, Heisenbergstr. 1, D. 70569 Stuttgart, Germany
[2] Max--Planck--Institut fuer Metallforschung, Heisenbergstr. 3, D.70569 Stuttgart, Germany
[3] Physics Department, Faculty of Science, Helwan University, Helwan-Cairo, Egypt
e-mail: S.Soltan@fkf.mpg.de

Heterostructures of high-temperature superconducting YBa_2Cu_3O_{7-\delta}, highly spin polarized, ferromagnetic La_{2/3}Ca_{1/3}MnO_3 and insulating SrTiO_3 are grown on different single-crystalline substrates by pulsed laser deposition. It can be shown by structural investigations such as x-ray diffraction and transmission electron microscopy that these structures grow epitaxially with high-quality interfaces. The determination of the magnetic properties of such multilayer systems by SQUID magnetometery shows that below the transition temperature of the superconductor asymmetric magnetic hysteresis loops are obtained. This observed asymmetry is originated by pinning of the flux lines in the superconductor at the magnetic domains in the ferromagnetic material.

THE XXV CONFERENCE ON: ***Solid State Physics and Materials Science***
&
WORKSHOP ON: ***Photonic Materials and Optoelectronic Devices (II)***
6 -10 March 2005 Luxor, Upper Egypt

B 1_4

Effect of Magnetic Order on Electric and Dielectric Properties of $Y_{3-x}Dy_xFe_5O_{12}$ garnet ferrites.

A. M. Abo El Ata

Physics Department, Faculty of Science, Tanta University,
Tanta, Egypt
E-mail address: aboelatta2000@yahoo.com

A series of polycrystalline garnet ferrites of composition $Y_{3-x}Dy_xFe_5O_{12}$ (where x= 0.5, 1.0, 1.5 and 2.0) was prepared by the standard ceramic technique to investigate their AC conductivity and dielectric properties. It was found that the AC conductivity □′ is strongly dependent of frequency at room temperature and slightly higher and that it increases with increasing temperature in a similar behavior of most semi conducting materials. Anomalies of □′ (T) curves at temperatures range 370 ≤T ≤400 were observed. These anomalies were attributed to the change of magnetic order at the compensation point. The AC conductivity obeys the universal power law of the form □(□) = A□$^{S(T)}$. The behavior of the exponent **s** of the power law with temperature indicates that the classical barrier hopping mechanism is the dominant conduction mechanism in these samples. The results of the dielectric constant □′ and the dielectric loss tangent tan□ were explained on the basis of the Maxwel-Wagner model and the assumption that the mechanism of dielectric polarization in ferrites is similar to that of the conduction process.

THE XXV CONFERENCE ON: ***Solid State Physics and Materials Science***
&
WORKSHOP ON: ***Photonic Materials and Optoelectronic Devices (II)***
6 -10 March 2005 Luxor, Upper Egypt

B 1_5

Study of a Cu Ni Substituted Mn Spinel Ferrites Suing X-ray, Initial Magnetic Permeability and Mössbauer Spectroscopy

Talaat. M. Meaz[a*], S. S. Ata-Allah[b], M. K. El-Nimr[a] and N. I. Saad[a].

[a] Physics Department, Faculty of science, Tanta University, Tanta, Egypt.
[b] Reactor and Neutron Physics department , Nuclear Research Center , Atomic Energy Authority, Cairo Egypt .

Samples with the chemical formula Cu_{1-x} Ni_x $Mn_{0.6}$ $Fe_{1.4}$ O_4 with (x=0.0,0.2, 0.4,0.6,0.8 and 1.0) were prepared by the usual ceramic technique. X-ray analysis revealed the presence of single spinel cubic phase, for samples with x=0.6, 0.8 and 1.0. While for samples with high Cu content with x=0,0 , 0.2 and 0.4, a small signal of a tetragonal phase were observed as well as the main dominant cubic phase. This observation attributed to solubility of Cu. The lattice parameters "a" was found to be a=8.372±0.041 for cubic spinel, while for tetragonal phase, the lattice parameters was found to be 5.80±0.07 and 8.71±0.25 for "a" and "c" respectively. The observed parameters are in agreement with the parameters listed in JCPDS cards. The temperature dependence of the magnetic permeability is plotted in the temperature range from room temperature up to 750 K. Measurements of the initial magnetic permeability show increasing with temperature to rich maximal and then minimum value at transition temperature T_c. The transition temperature (Curie temperature) T_c was found to decrease with decrease x value (molar ratio) i.e. it decrease with increase Cu content. The observed decrease of Tc was attributed to the magnetic interaction. The Mössbauer spectra of the investigated samples were measured at room Composition. The Mössbauer parameters are given versus compaction. The observed decrease in hyperfine field with increase of the Cu content, in agreement with decrease of curie temperature. The effect of irradiation with laser beam on the magnetic properties are under taken.

B 1_6

Effect of Fe Substitution on the Magnetic Properties of $SmCo_5$

A. Al-Sharif* and R. Moubydeen

Department of Physics, M'utah University- Jordan

We studied the alloys with composition Sm $(Co_{1-x}Fe_x)_5$ (x = 0, 0.05, 0.1, 0.15, 0.2 and 0.25). The splat cooling technique was used to prepare the alloys. The magnetic measurements were measured using the Vibrating Sample Magnetometer (VSM). The maximum field used for the magnetic measurements was 15 kOe. The room-temperature hysteresis loops measured by the VSM showed a reduction in the coercivity for $x \leq 0.15$ (compared with the x=0 sample), where it increases for $x \geq 0.2$. The remanence, magnetization at highest field used (15 kOe) and the value of $(BH)_{max}$ for all the samples were also obtained from the measured hysteresis loop, and it showed a decrease in its value with increasing Fe.

B 1_7

A Double Photoionization Study of Calcium Atoms for Equal and Unequal Electron Energy Sharing

Hany Hamdy

Atomic physics laboratory, Beni-Suef faculty of science, Cairo University, Beni-Suef, Egypt

The triple differential cross section (TDCS) for double photoionization of calcium atoms has been studied in the region of the Ca 3p —> 3d giant resonance, for equal and unequal energy sharing by the two electrons. The calcium photoionization TDCS in the in the region 3p —> 3d has been shown to depend strongly on the direction in which the fixed angle electron analyzer is observed relative to the E-vector of the synchrotron radiation. When the fixed angle electron is observed in the E-vector direction, at a resonant energy of 31.41 eV, the TDCS is dominated by a strong pair of maxima at relative angles close to 1000 and 2600. At a photon energy of 31.59 eV corresponding to a different resonance, the TDCS changes considerably, clearly demonstrating that the TDCS is resonance dependent. The calcium TDCS for unequal energy sharing by the two ejected electrons confirms that the TDCS for a relative angle of 1800 between the electrons is non-zero, and increases linearly with the energy of the faster electron within the energy range of measurements.

THE XXV CONFERENCE ON: ***Solid State Physics and Materials Science***
&
WORKSHOP ON: ***Photonic Materials and Optoelectronic Devices (II)***
6 -10 March 2005 Luxor, Upper Egypt

B 1_8

The Energy Levels and Transition Probabilities for Boron and Boron - Like Ions

Ensegam E. Zohny

Physics Department Faculty of Science Cairo University
Bani — Swef Branch.

The Slater type radial wave functions of the 41s, 2s, and 2p orbitals have been employed in order to construct the Hartree-Fock (HF) wave functions of the ground states $1s^2$ $2s^2$ 2p for B I, C II, N III, O IV and F V of the boron iso-electronic sequence. The radial functions of the excited orbital ns, np, nd and nf (n = 3 - 5) have been optimized using the CIV3 code which uses the multi-configuration Hartree-Fock (MCHF) method in evaluating these functions. The wave functions thus obtained have been used in calculating energy levels, oscillator strengths and transition probabilities. The calculated energies (in au) relative to the ground state were in a good agreement with the available published experimental and theoretical values within the experimental error for all levels of the ions of the sequence. The oscillator strengths for the allowed electric dipole transitions have been computed in dipole—length by using the same code. The transition probabilities for spontaneous emission A_{ji} (sec^{-1}) are calculated using the equation $A_{ji} = 6.6 \times 10^{15}\ g_i\ f_{ij} / \lambda^2\ g_j$ (sec^{-1}) where is the wavelength of the transition (in A°) from state (i) to state (j) and g_i, g_j are the statistical weights for these states, f_{ij} is the oscillator strength of the transition. Moreover results of oscillator strengths and transition probabilities are found to be in a fairly good agreement with the available published experimental and theoretical values.

THE XXV CONFERENCE ON: ***Solid State Physics and Materials Science***
&
WORKSHOP ON: ***Photonic Materials and Optoelectronic Devices (II)***
6 -10 March 2005 Luxor, Upper Egypt

B 1_9

Ab-initio Calculations for Forbidden E2 Decay Rates in Ti XIX ion

A. Farrag*

Physics Department, Faculty of Science, Cairo University
***** *email : azza_farrag@hotmail .com*

Rates of the electric quadrupole forbidden transition E2 in the ground configuration and some excited configurations of the Ti XIX ion have been calculated. The multiconfiguration Hartree - Fock method (MCHF) has been used. The relativistic corrections were included in the Breit - Pauli approximation. Some detailed comparison of the present theoretical results with the few existing calculations and available data in literature are discussed.

B 1_{10}

Theoretical Investigation of Some Experimental Data of Al-substituted MnZn Spinel Ferrites.

A. S. Seoud, S. A. Saafan, and R.E. El shater

Physics Department, Faculty of Science, Tanta University, Tanta, Egypt.

The present study, we aimed to find the best realistic theoretical methods to analyse experimental data taken for Al- substituted Mn Zn spinel ferrites.

For this purpose, we have followed two approaches. The first was by constructing a master curve of different functions of frequency such as the electrical conductivity σ*, the permittivity ε* and the electric modulus M*. These master curves could be found by a suitable scaling process to eliminate the effects of temperature and/or composition. After constructing the master curves, fitting equations which describe the behavior of the studied function have been given.

The second approach was by trying to find a realistic theoretical model in the literature, then to study the fitting of its equations with the investigated experimental data. We have found that Dyre's macroscopic model is based upon some reasonable assumptions and has approximated end equation for electrical conductivity that fit satisfactorily with the studied experimental data. We have to mention here that its approximated end equations based upon the effective medium approximation (EMA) has fitted well the conductivity data at frequencies greater than a characteristic frequency f_c –the onset of AC conduction- while its approximated end equation based upon the percolation path approximation (PPA) has fitted well the conductivity data at frequencies less than the characteristic frequency f_c.

B 1_{11}

Energies, Socillator Strenghs, and Lifetimes for Magnesium – Like Ions up to Vanadium XII

M. E. Yahis*, I. M. Azzouz**, S.H. Allam and Th. M. El-Sherbini

Laboratory of Laser and New Materials, Cairo University, Faculty of Science, Physics Department, Giza, Egypt.

Theoretical energy levels, oscillator strengths in LS-coupling for transitions among the levels of the terms belonging to the singlet $3s^2$, 3snl (n = 3-5, 1 = 0-3) configuration of Mg 1 through V XII are calculated using CIV3 computer code of Hibbert. The relativistic effects are not incorporated in this code. In order to keep our calculated energy levels as close as possible to the experimental values, we have made orbital function variational optimization into the code. In Comparison with available published data our results show good agreement.

B 1_{12}
Theoretical Studies of Light Propgation Through Different 1-D Quasiperiodic Photonic Crystals.

Ehab Abdel-Rahman
Department of Physics, Helwan University, Ain Helwan, Cairo, Egypt

Photonic crystals usually are periodic structures composed of dielectric materials and designed to display fascinating properties, such as spectral band gaps, in the propagation of classical electromagnetic waves. Structures with band gaps have numerous potential applications, for example in optical communications, filters, lasers, and microwaves. The term of quasiperiodic order is progressively spreading through different arenas of the physics society, not only by spurring the attention in additional clarifying its intangible relationships with more usual arrangements of matter (like periodic and random ones), but also by offering some promising possibilities for technological applications. In this work we will consider man-made quasiperiodic (QP) structures, leaving aside the broad fields of both quasicrystals and biopolymers, where quasiperiodicity spontaneously arises from the physical interactions among their basic building blocks. In turn, we will focus on QP multilayers that lately have received much attention both theoretically and experimentally. Generally speaking, new potentials from devices based on a QP stacking of different kinds of order in the same sample at different length scale. In fact, at the atomic level we have the usual periodic order determined by crystalline arrangement of atoms in each layer; but, at longer scales the QP order determined by sequential deposition of different layers plays the major role. This long-range aperiodic order is artificially imposed during system growth process and can precisely controlled. There is a spurred interest for both possible optical applications and theoretical aspects of light transmission in aperiodic media. This interest has motivated several theoretical works aimed to understand the interplay between the optical properties and the underlying aperiodic order of the system through the study of exciton optical absorption and fluorescence decay in aperiodic lattices. At the same time, new insights into the capabilities of aperiodically ordered systems have been recently demonstrated by a number of experimental achievements, involving second and third harmonic generation as well as the possible localization of light waves. In this work, theoretical study is presented for one-dimensional QP systems to analyze the role of QP order in the properties of light propagation through multilayered structures. We also compare the optical response versus of QP versus periodic systems in order to ascertain of the capabilities associated with inclusion of QP ordering of matter in the design of optical devices.

THE XXV CONFERENCE ON: ***Solid State Physics and Materials Science***
&
WORKSHOP ON: ***Photonic Materials and Optoelectronic Devices (II)***
6 -10 March 2005 Luxor, Upper Egypt

B 1_{13}

Fine-Structure Calculations of Energy Levels, Oscillator Strengths and Transition Probabilities for Sodium-Like Ions up to Kr Xxvi

W.O.Younis*, S.H.Allam and Th.M.El-Siierbini

Laboratory of Lasers and New Materials, Physics Department, Faculty of Science, Cairo University, Giza, Egypt

We have calculated fine-structure energy levels, oscillator strengths and transition probabilities for transitions among the terms belonging to the $1s^2\ 2s^2\ 2p^6\ ns(^2S)$, $1s^2\ 2s^2\ 2p^6\ np(^2P)$, $1s^2\ 2s^2\ 2p^6\ nd(^2D)$ (n = 3,4,5) and $1s^2\ 2s^2\ 2p^6\ nf(^2F)$ (n = 4,5) configurations. The calculations are based upon the general configuration interaction code CIV3 of Hibbert which uses orthonormal orbitals of radial functions expressed as superposition of normalized Slater type orbitals (STOs). Our calculated values are compared with experimental and other theoretical results where a satisfactory agreement is found. Moreover some new values are presented. PIIy Department, Faculty of Science, Cairo University, Bani-Suef Branch, Bani Suei Egypt

Session A2

Tuesday, March 8, 2005-02-25
(17:30 – 19:30)

Chairman

Prof. Dr. Lotfia El-Nady
Prof. Dr. Samy Allam

A 2_1

Angle-Resolved Reflectivity of Weakly and Strongly Photonic Crystals

Su-Lan Kuai, Georges Bader
Département de Physique et d'Astronomie, Université de Moncton, Moncton, New-Brunswick, Canada E1A 3E9

Vo-Van Truong*
Vice-Provost, Research, Concordia University, 1455 de Maisonneuve Blvd. West, BC 220, Montreal, Quebec, Canada H3G 1M8

Xing-Fang Hu
Shanghai Institute of Ceramics, Chinese Academy of Sciences, Shanghai 200050, China
* Email: tvovan@alcor.concordia.ca

Angle-resolved reflectivity measurements have been performed both for a weakly photonic crystal consisting of a synthetic opal and a strongly photonic crystal consisting of a titania inverted-opal. For synthetic opals, within the 0 ~ 70° range of incident angles only one peak was observed, which corresponded to Bragg diffraction by (111) plane. The position of these peaks agreed well with Bragg's law. For titania inverted opals, multiple peaks were observed with their dispersion relations quite different from the usual Bragg diffraction phenomenon. Multiple diffraction and coupling effects would be present in this latter case. Our results confirmed that complete photonic band gaps would exist in strongly photonic crystals when many-wave coupling leads to substantial deviations from simple Bragg diffraction with significantly flattened bands.

A 2_2

Stimulated Raman Scattering and Raman Lasers

G.M.A. Gad[1], H.J. Eichler[1], A.A. Kaminskii[3], H. Rhee[2]

[1]Physics Department, Faculty of Sciences, Helwan University,
Ain Helwan, Cairo, Egypt
[2]Institute of Optics, Berlin University of Technology,
D-10623 Berlin, Germany
[3] Institute of Crystallography, Russian Academy of Sciences,
117333 Moscow, Russia

High-order stimulated Raman scattering were excited under picosecond pump in the visible and near-IR in $PbWO_4$ and $Ba(NO_3)_2$ crystals. All observed Stokes and anti-Stokes lines were identified and attributed to the Raman shift 901 cm^{-1} and 1047 cm^{-1} of the investigated materials. Efficient second-Stokes Raman laser based on $PbWO_4$ and $Ba(NO_3)_2$ crystals pumped by a picosecond Nd:YAG laser at 1064.15 nm have been developed. Conversion efficiency of the second-Stokes Raman lasers dependence of crystal length was studied. The doubler crystal has used to convert the Raman lines to the red spectral region.

THE XXV CONFERENCE ON: ***Solid State Physics and Materials Science***
&
WORKSHOP ON: ***Photonic Materials and Optoelectronic Devices (II)***
6 -10 March 2005 Luxor, Upper Egypt

A 2_3

Thallium Addition Effect on the Structural and Optical Properties of $As_{20}Se_{80-x}Tl_x$ Films.

M. M. EI-Nahass[a], M.Dongol[b] M. Abou-zied[b] and

A. El-Denglawy[b]
[a] Phys. Dept. Fac. of Edu. Am Shams Univ., Cairo, Egypt b Phys. Dept. Fac. of Sci. South Valley Univ., Qena, Egypt

Thermal evaporation technique was used to deposit various samples of As on a glass substrate where x from 5% up to 35% at.%. The XRD and TEM studies were carried out for powder and thin films of $\mathbf{As_{20}Se_{80-x}Tl_x}$ for XRD and the other one was carried out for bulk samples where the results confirms the amorphous nature for the as prepared. Chemical composition of bulk- thin films analysis was done using EDS. A comparison between the computed and measured density was hold, where the measured density was smaller than the computed one and the difference was attributed to the material transformation to the amorphous nature. The optical energy gap E_g^{opt} of the as deposited films was determined from transmission and reflection spectra. The decrease of E_g^{opt}, with increasing Ti content was attributed to effect of localized states. The optical constants n. k could be determined and were found to be increase with increasing of Ti-content. The dielectric constant (ε_∞ and ε_L) are increase with the increasing of Ti-content. Dispersion parameters were determined according to Wempie-DiDomenico relationship.

A 2_4

Erbium-Doped Fibers as Nonlinear Switching Device "Optical Switches"

[3]H. J. El-Khozondar[1], R. J. El-Khozondar[2], T. Shay[3]

[1] Electrical and Computer Engineering Dept., Islamic Univ., Gaza, Palestine
[2]Department of Physics, Al-Aqsa University, Gaza, Palestine
[3]Center for High Technology Materials, UNM, USA
[1] hala_elkhozondar@yahoo.com

During the last years, the demand for more data capacity in telecommunication networks has considerably increased, mainly due to the internet. It has become widely accepted that optical networks should fully replace the traditional electronics. The way to fulfill this is by producing optical switches/gates. The important factor in switching quality is switching speed, which is determined by response time of the material used in constructing the switch. Erbium-doped fiber is known as low power nonlinear elements for construction switching devices. Erbium-doped fibers have an important advantage that their resonant wavelengths are in visible and infrared ranges, particularly near 1550 nm communication window. The purpose of this study is to show the possibility to construct a switch as fast as subpicoseconds by performing theoretical studies on Erbium-doped fiber. Results will be demonstrated and recommendations will be given.

A 2_5

Optical and Electrical Properties of Some Borovanadate Glasses.

M.M.El-Oker, M.I. Mohamed, M. Farouk, Hamad El-Khamiss and H.M Talaat.

Physics Department, Faculty of Science Al – Azhar Univ., Cairo
Public Authority for Applied Education and Training – Calling of Technology –Kuwait

Glass Samples of composition $\{(Na_2B_4O_7)_{100-x}\ (V_2O_5)_x$ with x = 0,5,10,15 and 20 mol %}containing Silver Oxide (Ag_2O) were prepared. The amorphous natures of samples were proved by X-ray diffraction. Transmission in the range 320 – 2500nm were measured and used for band gap determination. Optical band gap (E_{opt}) was found to increase by increasing V_2O_5 content whereas band tail width (E_e) show opposite trend i.e. E_{opt} decrease with increasing V_2O_5 content. A.C conductivity of the prepared samples has been measured in the frequency range (o.1-20 KHz) over the temperature range (300-633 K). The obtained data reveals that, $\sigma_{a.c}$ obey the relation $\sigma_{a.c}\ (\omega) = A\omega^s$ and the exponent s was found to decrease with increasing temperature. The analysis of the results reveals that, a.c conductivity of the investigated samples interpreted in terms of correlated barrier hopping (CBH).The dependence of dielectric constant on both frequency and temperature are also discussed.

THE XXV CONFERENCE ON: ***Solid State Physics and Materials Science***
&
WORKSHOP ON: ***Photonic Materials and Optoelectronic Devices (II)***
6 -10 March 2005 Luxor, Upper Egypt

A 2_6

Determination of Thickness and Porosity of Porous Silicon Layer Using Photoacoustic Technique

S. Abdalla[1], T.A. El- Brolossy[2], G.M. Yossef[2]. S. Negm[1] and H. Talaat[2]

[1]Physics Department, Faculty of Science, Ain Shams University, Abbsssia Cairo, Egypt
[2]Department of Physics and Mathematics, Faculty of Engineering, Zagazig University, (Shoubra), Cairo, Egypt

The thickness of thin porous layers of silicon samples and their varying porosity have been determined using photoacoustic technique (PA). The measured values of the effective thermal diffusivity (α_{eff}) and effective thermal effusivity (e_{eff}) were exploited to determine the thickness of porous silicon (p-Si) film using the effective layer model. Also the determined α_{eff} together with the two-layer model were used to obtain the thermal diffusivity of the p-Si layer only. Furthermore using Maxwell- Rayleigh model, the porosity percentage for the different samples were determined and compared to the results obtained by scanning electron microscope (SEM) with 10 % variations.

A 2_7

Compositional Dependence of Optical Constants in Thin Films of $Ge_{1-x}Se_2Pb_x$

L.A. Wahab and H.H. Amer

National Center for Radiation Research and Technology,
Nasr City, Cairo.

Optical constants of vacuum evaporated thin films in the $Ge_{1-x}Se_2Pb_x$ (x = 0, 0.2, 0.4, 0.6) system were estimated from reflectance and transmittance spectra. The optical gap energy has been calculated from the absorption. It is found that the films exhibit non-direct gap which decrease with increasing Pb content. The variation in the refractive index and the imaginary part of the dielectric constant with photon energy have also reported.

THE XXV CONFERENCE ON: ***Solid State Physics and Materials Science***
&
WORKSHOP ON: ***Photonic Materials and Optoelectronic Devices (II)***
6 -10 March 2005 Luxor, Upper Egypt

A 2_8

Effect of Sintering Temperature on FT-Raman and up-Conversion Photoluminescence of Nano-Structure Er^{3+}: TiO_2 Thin Film Prepared by Spin Coating sol-gel technique

Y.Badr[1] and I. K. Battisha[2]

[1]National Institute of Laser Enhancement Sciences (NILES), Cairo University, Egypt.
[2]National Research Center (NRC) Department of Solid State Physics, Cairo, Egypt

Sol-gel derived nano-structured titania films doped with 5 % Er^{3+} ions were prepared by spin coating sol-gel technique. The coating sol was obtained by hydrolysis of Ti $(OC_4H_9)_4$ in isopropanol / HCl solution. The films of anatase with columnar and rectangular structure were obtained after annealing at 500^{o}C. The structural evaluation and crystallization behavior with thermal treatment up to 1100^{o}C are followed by FT-Raman and XRD. The gel film heat treated at sintering temperature 500^{o}C, has crystallite size equal to 5 nm. The FT-Raman spectrometer with Nd–Yag laser wavelength 1064 nm as light source were used for the investigation of the prepared samples. The morphology of the film was evaluated by SEM. The up-conversion emissions were evidenced in the thin film samples under investigation. The up-conversion was found to depend strongly on the Er3+ ion. The blue, green and IR emission has been attributed to the ground state-directed transition from (2H9/2), (2H11/2 + 5S2) and (4F9/2), which are populated through excited state absorption (ESA) for 808 nm excitation.

THE XXV CONFERENCE ON: ***Solid State Physics and Materials Science***
&
WORKSHOP ON: ***Photonic Materials and Optoelectronic Devices (II)***
6 -10 March 2005 Luxor, Upper Egypt

A 2$_9$

Mössbauer, Infrared and X-ray Studies of $Ni_{0.5}Zn_{0.5}Cr_xFe_{2-x}O_4$ Ferrites

M. A. Amer[1], T. M. Meaz[1*,] S. Aboul-Enein[1] and M. O. Abd-El-Hamid[2.]

[1]Physics Department, Faculty of Science, Tanta University, Tanta, Egypt.
[2-] Faculty of Science, Minia University, Minia, Egypt.

Spinel ferrites of the system $Ni_{0.5}Zn_{0.5}Cr_xFe_{2-x}O_4$, $0 \leq x \leq 1$, have been studied using the Mössbauer, IR and X-ray spectra. The Mössbauer spectra of the samples showed broad six-line patterns and a central paramagnetic phase. The spectra have been analyzed into two magnetic patterns and two quadrupole doublets. The deduced hyperfine interaction parameters were studied and discussed as functions of the Cr^{3+} contents x, where the cation distribution of the compounds was estimated. Five absorption bands were observed in the infrared spectra in the range between 1100 and 200 cm^{-1}. The refractive index, the IR absorption in the samples and the jump rate of the lattice vacancies have been determined and discussed as functions of x. The Jahn-Teller effect affecting Fe^2, Ni^{2+} and/or Cr^{4+} ions has been observed. From X-ray analysis, the true, and theoretical lattice parameters, the oxygen parameter and the ionic radii, bonds, edges and hopping lengths of the A- and B-sites have been estinated and discussed in the light of Cr^{3+} ion content x.

THE XXV CONFERENCE ON: ***Solid State Physics and Materials Science***
&
WORKSHOP ON: ***Photonic Materials and Optoelectronic Devices (II)***
6 -10 March 2005 Luxor, Upper Egypt

A 2_{10}

Some Optical Properties of Na_2O- B_2O_3 - TeO_2 Glass System

M. El-Sayed* [*], Elsayed Yousef

Faculty of science, Azaher university, physics Department, Assuit
e-mail: sayed19652000@yahoo.com

The optical properties of new glasses of Na_2O- B_2O_3 - TeO_2 system containing levels of TeO_2 have been determined. The refractive index variation versus TeO_2 content and the composition has been considered. Likewise, the refractive index and spectral transmittance in the range 200 - 2500 nm for these glasses has been carried out. From thes optical measurements it can be stated that glasses of Na_2O- B_2O_3 - TeO_2 system would be adequate for infrared windows or laser matrices.

Session B2

Tuesday, March 8, 2005-02-25
(17:30 – 19:30)

Chairman

Prof. Dr. Karemat El-Sayed
Prof. Dr. Ibrahim Farag

THE XXV CONFERENCE ON: ***Solid State Physics and Materials Science***
&
WORKSHOP ON: ***Photonic Materials and Optoelectronic Devices (II)***
6 -10 March 2005 Luxor, Upper Egypt

B 2_1

Detached Growth of Ice Crystals

G. A. Gamal

Phys. Dept. Faculty of Science, South Valley University, Qena, Egypt.
E-mail: Profdrgamal@yahoo.com

Detached solidification is a new trend of crystal growth science. Detached growth has been investigated in this study. The vertical Bridgman technique was used to directionally solidify water under some operating conditions, gas bubbles or gas tubes formed and incorporated in the ice crystal only at the ampoule wall, and not in the interior. The neighboringhood of the freezing interface was observed and recorded on videotape by CCD camera, monitor VCR and a computer where frames were grabbed with HL – image software. The resulting pictures were obtained at different growth conditions. Accordingly we could specify and observe the effect of the operating conditions.

THE XXV CONFERENCE ON: ***Solid State Physics and Materials Science***
&
WORKSHOP ON: ***Photonic Materials and Optoelectronic Devices (II)***
6 -10 March 2005 Luxor, Upper Egypt

B 2_2

Crystal Growth and Microstructural Properties of In_3Te_4 Single Crystals

G. A. Gamal, M. Abou Zied and A. A. Ebnalwaled

Physics Department, Faculty of Science ،South Valley University ،Qena 83511 ، Egypt

X – ray line profile analysis was applied to obtain structural parameters (crystal lattice, grain size, micro-strain, dislocation density and the dislocation arrangement) of In_3Te_4 single crystals. The samples were prepared by a special modification of vertical Bridgman Stockbarger technique. This crystal growth technique was suggested for the first time. The Bragg peak line shapes of In_3Te_4 single crystals were analyzed with the aid of Scherrer equation, Williamson – Hall plot, and Warren – Averbach method. From the present study it is concluded that the grown In_3Te_4 crystal has tetragonal structure. The lattice parameter has been calculated from (013), (020), (113), (015), (220), (222), (132), (332), (242), and (244) reflections. The density of dislocations, the average distance between the adjacent dislocation and the dislocation arrangement parameter has the values 1.6 x 10^{-14} m^{-2}, 8.27 nm, and 0.177 respectively.

THE XXV CONFERENCE ON: ***Solid State Physics and Materials Science***
&
WORKSHOP ON: ***Photonic Materials and Optoelectronic Devices (II)***
6 -10 March 2005 Luxor, Upper Egypt

B 2$_3$

On The Structure of As_2Te_3 Glass

M.M. Dongol [a] ***, Th. Gerber*** [b] ***, M. Hafiz*** [c] ***, M. Abou-Zied*** [a] ***and A.F. Elhady*** [a]

[a] *Physics Department, Faculty of Science, South Valley University, Qena, Egypt.*
[b] *Physics Department, Faculty of Science, Rostock University, Rostock, Germany.*
[c] *Physics Department, Faculty of Science, Assuit University, Assuit, Egypt.*

X-ray scattering has been used to investigate the structure of glassy As_2Te_3, prepared by quenching in liquid nitrogen. The result of the coherent scattered x-ray intensity proved that the Medium-Range Order, MRO, is very weak and this was attributed to the higher metallic nature of the glass. To determine the Short-Range Order, SRO, the Radial Distribution Function, RDF, was calculated by Fourier transformation of the interference function. The RDF curve is characterized by a first peak located at 2.7 Å. Comparison with the interatomic-distances in crystalline arsenic telluride indicate that the SRO in glassy state is different from that in the crystalline. The area under the first peak has been compared with those calculated for a Chemically Ordered Network Model, CONM, and Random Covalent Network Model, RCNM. The RCNM of As-As, As-Te and Te-Te bonds provides satisfactory fit to the experimental value.

THE XXV CONFERENCE ON: ***Solid State Physics and Materials Science***
&
WORKSHOP ON: ***Photonic Materials and Optoelectronic Devices (II)***
6 -10 March 2005 Luxor, Upper Egypt

B 2_4

Calculation of Heating Power Generated From Ferromagnetic Thermal Seed (PdCo-PdNi-CuNi) Alloys Used as Interstitial Hyperthermia Implants

Adly H.El-Sayed, A.A.Aly, N.I.EI-Sayed*, M.M.Mekawy* and A.A.EI-Gendy*

Physics Department, Faculty of Science, Alexandria University, Egypt.
**National Institute for Standards, Giza, Egypt.*

High quality heating device made of ferromagnetic alloy (thermal seed) was developed. The device generates sufficient heat at room temperature and stops heating at the Curie temperature T_c. The power dissipated from each seed was calculated from the area enclosed by the hystresis loop. A new mathematical formula for the calculation of heating power was derived and shows a good agreement with those calculated from hysteresis loop and calorimetric method. The dependence of the heating power on the frequency of the applied magnetic field shows an exponential behaviour with constant frequency of about 81 kHz below T_c.

THE XXV CONFERENCE ON: ***Solid State Physics and Materials Science***
&
WORKSHOP ON: ***Photonic Materials and Optoelectronic Devices (II)***
6 -10 March 2005 Luxor, Upper Egypt

B 2_5

Microstructural Simulation of Grain Growth in Two-Phase Polycrystalline Materials

R. El-Khozondar[1], H. El-Khozondar[2], G. Gottstein[3], A. Rollet[4]

[1]Department of physics, Al-Aqsa university, Gaza, Palestine
[2]Electrical and Computer Engineering Dept., Islamic Univ., Gaza, Palestine
[3]Institut für Metallkunde und Metallphysik, RWTH Aachen, Germany
[4]Department of Material Sci. & Eng., CMU, Pittsburgh, PA, U. S. A.
Rifa20012002@yahoo.com

A quantity of vital engineering materials is example of two-phase materials in which each phase may be polycrystalline. The structure of polycrystalline materials which consist of small grains is not steady but evolves with time. In numerous cases, both phases of these materials may undergo grain growth which may affect their electrical and mechanical properties. Therefore, substantial efforts have been devoted to understand the microstructural evolution of polycrystals to improve their performance in microelectronic industries. Numerical method based on Monte Carlo Potts model is used to investigate microstructural evolution of two-phase polycrystalline materials in which grain growth in both cases is controlled by grain boundary diffusion (n=4). It is shown that the microstructural evolution of two-phase polycrystals eventually reaches an asymptotic regime in which grain growth in both phases is coupled due to Zener pinning and obeys a power-law relationship $d \sim t^{1/n}$. This conclusion is valid in a broad parameter range and is compatible with theoretical predictions and laboratory experiments.

B 2_6

Effect of ZrO_2: On Elastic and Thermal Properties of Tellurite Glass in the System [TeO_2- WO_3].

El Sayed Yousef, El Sayed Moustafa

Department of Physics, Faculty of Science, Al Azhar University, Assuit Branch, Assuit, Egypt

The relationships between structure and elastic properties, thermal stability of tellurite glass in the system TeO_2- WO_3- ZrO_2 are investigated. The density, longitudinal and shear velocity, Young's and bulk modulus, Deby temperature, Poison's ratio are found to be sensitive to the structure of present glass. Quantitatively, by using the bond comperssion model for analyzing the room temperature elastic moduli data. We have also investigated the glass transition and softing temperature of the glass. Our glass are disordered versions W^{4+} and W^{6+} ion coordination states. By calculated the number of bonds per unit volume, the average stretching force constant, and the average ring size, we have been obtained more information about the structure of present glass.

THE XXV CONFERENCE ON: ***Solid State Physics and Materials Science***
&
WORKSHOP ON: ***Photonic Materials and Optoelectronic Devices (II)***
6 -10 March 2005 Luxor, Upper Egypt

B 2_7

Lead Iodide Radiation Detectors Crystal Growth and Characterization

Mahmoud Hassan[1] *and* ***Marie Matuchova***[2]

[1]*Electronics Engineering Department Princess Sumaya University*
Amman- Jordan , m.hassan@psut.edu.jo
[2]*Institute of Radio Engineering and Electronics,*
Czech Academy of Science
Prague – Czech Repupublic

This paper reports initial results for characterization of lead iodide crystals which have been grown using direct synthesis and the introduction of rare earth elements as admixtures during synthesis. Leakage currents, electrical resistance, voltage- capacitance and photo luminance measurements will be reported. The results suggest the good possibility of using lead iodide crystals as room temperature radiation detectors.

B 2_8

Study of the Amorphous Structure of Some Borate Glasses by Ultrasonic Technique

Yasser B. Saddeek and A. M. Abousehly

Physics Department, Faculty of Science, Al Azhar University, (Assiut)

The velocity of longitudinal and transverse ultrasonic waves in different compositions of 10 Al_2O_3 - 29Na_2O - (66-x) B_2O_3 -x Bi_2O_3, glass system have been measured at room temperature using the pulse echo technique. The velocity data have been used to determine the elastic moduli, Poisson's ratio and some other physical parameters such as, Debye temperature, and softening temperature. The results indicate that the elastic moduli depend upon the composition of the prepared glass. Quantitative analysis has been carried out, in order to obtain more informations about the structure of these glasses.

THE XXV CONFERENCE ON: ***Solid State Physics and Materials Science***
&
WORKSHOP ON: ***Photonic Materials and Optoelectronic Devices (II)***
6 -10 March 2005 Luxor, Upper Egypt

B 2_9

Creep Behaviour of Nearly Eutectic Sn-Ag and Sn-Ag-Zn Solder Alloys

A.Fawzy*, N. Habib, M. Sobhy, E. Nassr and G. Saad

Physics Department, Faculty of Education, Ain Shams University, Cairo, Egypt.
e-mail : A.Fawzy1955@yahoo.com

The materials used in the present study are Sn-3.5wt%Ag and Sn-3.5wt%Ag-1wt%Zn alloys. The effect of stress,σ, ageing temperature,T_a, and ageing time, t_a, on the creep resistance of the alloys under investigation have been performed. Creep tests were performed under different stresses ranged from 8.8 to 14.2 MPa at the ageing temperatures 353, 373, 393 and 413K. Each specimen was kept at each temperature for 1, 20 and 50 hours. The addition of 1wt%Zn on the binary lead-free solder (Sn-3.5wt%Ag) resulted in the increase of its creep resistance, while increasing T_a and/or t_a was found to lower the creep strength of both alloys. The micro-structural changes in the two alloys were investigated by optical and transmission electron microscope (TEM).

THE XXV CONFERENCE ON: ***Solid State Physics and Materials Science***
&
WORKSHOP ON: ***Photonic Materials and Optoelectronic Devices (II)***
6 -10 March 2005 Luxor, Upper Egypt

B 2_{10}

Grain Size Dependence of Work Hardening in Zn-1%wt Cu Alloy During Phase Transformation

A.Fawzy, M.Sobhy*

Physics Department, Faculty of Education, Ain Shams University, Cairo, Egypt.
E-mail. miladsobhym@yahoo.com.

Work hardening characteristics of Zn-1%wtCu alloy of various grain diameters have been investigated in the temperature range from 453 K to 573K.The work–hardening coefficient χ_p, yield stress σ_y and fracture stress σ_f of the tested samples were found to decrease with increasing deformation temperature by two different rates corresponding to two temperature ranges. The first temperature range was found to be less than 513K while the second temperature range was found to be higher than 513K. The decrease in the first range was attributed to the formation of Є- phase. The transition to the second range was referred to the dissolution of this phase. This was confirmed by the investigation of specimens in the two temperature ranges using TEM and X-ray diffraction analysis.

Session A3

Wednesday, March 9, 2005-02-25
(15:00 – 17:00)

Chairman

Prof. Dr. Nabil Gonaim
Prof. Dr. Nabil Raslan

THE XXV CONFERENCE ON: ***Solid State Physics and Materials Science***
&
WORKSHOP ON: ***Photonic Materials and Optoelectronic Devices (II)***
6 -10 March 2005 Luxor, Upper Egypt

A 3_1

Investigation of the Electrical Properties of Some Dental Composite Restorative Materials before and after Laser Exposure

M. M. Shehata[1], *M. A. Elkestawy[2], S. A. Saafan[3] and A. M. Saafan[4].

[1]Department of Dental materials, Faculty of Dentistry,
Tanta University, Tanta, Egypt.
[2]Physics Department, Faculty of Education, Suez Canal University,
Suez, Egypt.
[3]Physics Department, Faculty of Science, Tanta University, Tanta, Egypt.
[4]Medical and Biological Applications Department, National Institute of
Laser Enhanced Sciences, Cairo University, Egypt.
E-mail: mkastawy@yahoo.com

Some electrical properties such as piezoelectricity, A.C. conductivity, dielectric constant and loss tangent of nine commercial types of dental composite restorative materials have been investigated before and after laser exposure for two seconds to study the effect of a probable laser exposure during some surgeries on the electrical properties of these materials. No piezoelectric effect has been found in these materials before and after laser exposure. The materials were found to be good insulators (very poorly conducting materials). The temperature and frequency dependence of A.C. conductivity, dielectric constant and loss tangent have shown slight changes in behaviour but there were no significant changes in values after laser exposure.

THE XXV CONFERENCE ON: ***Solid State Physics and Materials Science***
&
WORKSHOP ON: ***Photonic Materials and Optoelectronic Devices (II)***
6 -10 March 2005 Luxor, Upper Egypt

A 3_2

Magnetic and Electrical Properties of the Lanthanum and Calcium Deficient $La_{0.5}Ca_{0.5}$ MnO_3 Manganites

I. Walha[1], W. Boujelben[1], S. Zouari[1], M. Koubaa[1,2], A. Cheikhrouhou*[1], A. M. Haghiri-Gosnet[2]

[1]Laboratoire de Physique des Matériaux, Faculté des Sciences de Sfax, B. P. 802, 3018 Sfax, Tunisia.
[2]Institut d'Electronique Fondamentale, IEF/ UMR 8622, Université Paris Sud, Bâtiment 220, 91405 Orsay Cedex, France.
Abdel.Cheikhrouhou@fss.rnu.tn

We present a comparative study of the physical properties of the calcium-deficient $La_{0.5}Ca_{0.5-x}\square_xMnO_3$ and lanthanum-deficient $La_{0.5-x}\square_xCa_{0.5}$ MnO_3 manganese oxides. Powder samples have been elaborated using the conventional solid-state reaction technique at high temperature. All our synthesized samples are single phase and crystallize in the orthorhombic perovskite structure with Pnma space group. The parent compound $La_{0.5}Ca_{0.5}MnO_3$ exhibits at zero field a semiconducting behaviour in the whole temperature range 20-300K with an increase of the resistivity at very low temperature which can be attributed to the charge ordering (CO) effect. Applied magnetic field leads to an important decrease of the resistivity values at low temperature and consequently a destruction of the CO effect observed at low temperature, it induces also a semiconducting-metallic transition when the temperature decreases. Magnetic measurements versus temperature and versus magnetic applied field show that all our deficient samples exhibit a transition from paramagnetic to an ordered state with decreasing temperature. The ordered state depends strongly on the deficient element. The defect effects in the A site on the electrical properties are also substantially different for both deficient series. With deceasing temperature, the calcium-deficient samples show a semiconducting-metallic- transition with an increase of the electrical transition temperature when calcium-deficient content increases, however we observe a semiconducting behavior in the whole temperature range 20-300K in the lanthanum-deficient ones. The calcium-defect effects on the electrical properties are spectacular, in fact only 5% of calcium deficiency induces in zero field the same effect on the resistivity as observed in the parent compound in a magnetic applied field of 8T.

THE XXV CONFERENCE ON: ***Solid State Physics and Materials Science***
&
WORKSHOP ON: ***Photonic Materials and Optoelectronic Devices (II)***
6 -10 March 2005 Luxor, Upper Egypt

A 3_3

Study of Some Structural, Electrical and Magnetic Properties of Mn-Substituted SrCu Hexagonal Ferrite

S.A. Saafan, A.M. Abo El Ata and M. El Messeery

Physics Department, Faculty of science, Tanta University, Tanta, Egypt.
e-mail: samiasaafan@hotmail.com

Y-type hexagonal ferrite samples with the composition Sr (x 0.0, 0.4, 0.8, 1.2, 1.6 and 2.0) have been prepared by the ceramic method. The x ray diffraction patterns at room temperature show that the prepared samples have a single phase and the effect of composition on the unit cell parameters, density and porosity has been studied. The D.C. conductivity has been measured by using a two- probe method in the temperature range (3 00K - 470K) and a four-probe method in a wider range of temperature (300K — 750K). The activation energy in both ferromagnetic (Er) and paramagnetic (Er) regions along with the Curie points have been pointed out. The activation energy values in the ferromagnetic region (Er) calculated from the two-probe method plots were found to be in agreement with those calculated by using the four-probe method. The variation of the initial magnetic permeability (p,) with temperature for all the investigated samples in the temperature range 300K-780 K has shown three regions of behaviour which has been explained on the basis of the proportionality 1 cc MS2 IKe - where M is the saturation magnetization and Ketj is the effective magnetocrystalline anisotropy constant - along with the expected distribution of both Mn and Cu ions in the lattice. The temperature dependence of selectivity for a chosen frequency (f = 1.6MHz) for the six investigated samples also has been studied.

THE XXV CONFERENCE ON: ***Solid State Physics and Materials Science***
&
WORKSHOP ON: ***Photonic Materials and Optoelectronic Devices (II)***
6 -10 March 2005 Luxor, Upper Egypt

A 3_4

Study of Some Properties of Waste LDPE/waste Butyl Rubber Blends Using Different Compatibilizing Agents and Gamma Irradiation

Nabila A. maziad and Medhat M. Hassan

Department of polymer chemistry
National center for Radiation research and Technology,
P.O Box 29,Nasr City, Cairo, Egypt.

Copolymer blends of waste low-density polyethylene (WLDPE) with waste butyl rubber (WBR) on equal quantity using reactive compatibilizing agents such as maliec anhydride, glycidyle methacrylate (GMA), Divinyl benzene (DVB), Tetraethyleneglyco idimethacrylate (TEGDMA) and diethyleneglycoldimethacrylate (DEGDMA) were prepared and exposed to different gamma-irradiation doses ranged from (0-400) kGy. The swelling behavior in organic solvent and the gel and soluble fractions and the degree of crosslinking were investigated. The mechanical properties by mechanical tests were studied, thermal properties using thermogravimetric analyzer (TGA) and differential scanning calorimetry (DSC) techniques, X-ray diffraction (XRD) analysis have been studied to know the change on the morphological structure for the polymeric blend. Also, scanning electron microscopy (SEM) study the surface nature for the irradiated and non radiated blends.

THE XXV CONFERENCE ON: ***Solid State Physics and Materials Science***
&
WORKSHOP ON: ***Photonic Materials and Optoelectronic Devices (II)***
6 -10 March 2005 Luxor, Upper Egypt

A 3_5

Influence of Sintering Time on Debye′s Relaxation Time and Related Properties at (Pb, La) TiO3 Ceramics

M.K.Gergs

Physics Department, Faculty of Science (Qena),
South Valley University, Egypt.

This paper sheds light on the influence of the variation in the sintering time on the ferroelectric properties, Debye′s relaxation time and consequently the activation energy for ($Pb_{0.8125}$ $La_{0.125}$□ $_{0.0625}$) TiO3 Ceramics. The dielectric measurements have been carried out under electric field of frequencies equal to 1 KHz and 100 KHz. In this paper, the dielectric measurements and the results which were calculated by Debye′s equation for the ferroelectric materials showed an increase for the peak of dielectric constant and Curie relaxation time with increasing the sintering time t_s. The sample with relative higher sintering time (t_s=18 hours) characterizes with higher peak for dielectric constant (ε_{max} = 11500) and maximum value of Curie relaxation time(τ_c= 4.09×10^{-7} sec.). The results are in a good agreement with those known in literature. The behavior of the dielectric constant is interpreted on the basis of the relationship between sintering time and the grain size and consequently the volume of the domain. Also the values of Curie Weiss constants (C^- , C^+) and activation energy as a function of t_s have been determined. Curie Weiss constant in the samples of present paper is the effective factor for the calculated activation energy.

THE XXV CONFERENCE ON: ***Solid State Physics and Materials Science***
&
WORKSHOP ON: ***Photonic Materials and Optoelectronic Devices (II)***
6 -10 March 2005 Luxor, Upper Egypt

A 3_6

Effect of Magnetic Order on Electric and Dielectric Properties of $Y_{3-x}Dy_xFe_5O_{12}$ garnet ferrites.

A. M. Abo El Ata

Physics Department, Faculty of Science, Tanta University, Tanta, Egypt
E-mail address: aboelatta2000@yahoo.com

A series of polycrystalline garnet ferrites of composition $Y_{3-x}Dy_xFe_5O_{12}$ (where x= 0.5, 1.0, 1.5 and 2.0) was prepared by the standard ceramic technique to investigate their AC conductivity and dielectric properties. It was found that the AC conductivity □′ is strongly dependent of frequency at room temperature and slightly higher and that it increases with increasing temperature in a similar behavior of most semi conducting materials. Anomalies of □′ (T) curves at temperatures range 370 ≤T ≤400 were observed. These anomalies were attributed to the change of magnetic order at the compensation point. The AC conductivity obeys the universal power law of the form □(□) = A□$^{S(T)}$. The behavior of the exponent **s** of the power law with temperature indicates that the classical barrier hopping mechanism is the dominant conduction mechanism in these samples. The results of the dielectric constant □′ and the dielectric loss tangent tan□ were explained on the basis of the Maxwel-Wagner model and the assumption that the mechanism of dielectric polarization in ferrites is similar to that of the conduction process.

THE XXV CONFERENCE ON: ***Solid State Physics and Materials Science***
&
WORKSHOP ON: ***Photonic Materials and Optoelectronic Devices (II)***
6 -10 March 2005 Luxor, Upper Egypt

A 3_7

Losses Mechanisms and Elctromechanical Coupling Coefficient of Piezoceramic Materials

A. M. Abdel .Fattah*[*], *M .G. S .Ali*[**], *N. Z. ELsyed*[*] ,
***Gharieb. A. Ali*[***]**

[*]*National Institute for Standards NIS-Egypt - Momaahlam@yahoo.com*
[**]*Menia University – Faculty of science - Egypt Galal_7@hotmail.com*
[***] *National Institute for Standards NIS-Egypt - Gharieb35@yahoo.com*

The most demand task of piezoceramic materials is their ability to converts all electrical energy into acoustic energy. Therefore the important characteristic of such materials is the energy conversion efficiency. The elctromechanical coupling coefficient (EMCC) is commonly used as a measure of a piezoceramic material efficiency. The elctromechanical coupling coefficient EMCC of a sex unloaded unclamped piezoceramic plates are deduced using two different theoretical models. The total losses tangent factor of the plate's materials PZT-5H was estimated from the variation of driving point electrical impedance over the interested frequency band rather than the sensitivity of each plate within this band.

THE XXV CONFERENCE ON: ***Solid State Physics and Materials Science***
&
WORKSHOP ON: ***Photonic Materials and Optoelectronic Devices (II)***
6 -10 March 2005 Luxor, Upper Egypt

A 3_8

Correlation Between Estimated and Experimental Bonding In PZT's Materials

S. Ibrahim, A. M. Shamah F. F. Hanna, and L. K. Marei

Faculty of Petroleum and Mining Engineering,
Suez Canal University, Suez, Egypt
fariedhanna@yahoo.com

The nature of bonding in ABO_3 perovskite structure is closely related to the structure type properties such as its electrical properties. The lead zirconate titanate (PZT) doped with Mn-ions $(PbZr_{0.53}Ti_{0.47-x}Mn_x)O_3$ with x = 0, 0.004, 0.008 and 0.016 Mn were prepared and examined by X-ray. The Full Prof program was used to estimate the bonding length of the various doped PZT's materials. The degree of tetragonal unit cell distortion is Mn-content dependence. Results are presented and compared with the theoretical calculated bonding lengths available in the literature. The observed changes in bonding distance have been related to a relative high covalent character of the various metallic ions with Oxygen mainly.

THE XXV CONFERENCE ON: ***Solid State Physics and Materials Science***
&
WORKSHOP ON: ***Photonic Materials and Optoelectronic Devices (II)***
6 -10 March 2005 Luxor, Upper Egypt

A 3_9

Dielectric and A.C conductivity for Ba Co2-x Cux Fe16 O27 ferrites.

H. M. EL-labany.

Physics Department , Faculty of Science , Tanta University,Egypt.

A series of W-type hexaferrite samples with composition Ba Co2-x Cux Fe16 O27 with x = 0.4, 0.6, 0.8, 1 and 1.2 were prepared by the standard ceramic technique , Ac conductivity measurments were carried out at different frequencies (10^2 Hz to 10^5) and at different temperatures. The dielectric constant Єr and loss factor tanδ were measured in the same range of temperatures and frequencies. The measurements were carried out using the phase detector technique (lock – in amplifier SR 510 stanford research system, USA). The resultes showes that the conductivity increases with both temperature and frequency and it becomes frequency independent at high temperatures. The dielectric constant increases with increasing temperature and it gives abnormal behavior with frequency, where a relaxation peaks were observed at certain frequencies, The peaks shift to higher frequency with icreasing temperature . The abnormal behavior was explained due to the presence of two types of charge carriers.

THE XXV CONFERENCE ON: ***Solid State Physics and Materials Science***
&
WORKSHOP ON: ***Photonic Materials and Optoelectronic Devices (II)***
6 -10 March 2005 Luxor, Upper Egypt

A 3_{10}

Vulcanizing System Dependence of the Dielectric, Rubbery Swelling and Doppler Shift Characteristics of IIR/EPDM Blends.

F. Abd El-Salam[1], M.H.Abd-El Salam[1*] and M. I. Mohamed[1]

1 Physics Department, Faculty of Education,
Ain Shams University, Cairo, Egypt
Email: mh_abdelsalam@lycos.com

Effect of the vulcanizing system on the dielectric, rubbery swelling and Doppler shift characteristics of IIR/EPDM -carbon black (GPF) blends have been studied. Three different vulcanizing systems were used in the present study namely, Elemental sulpher (S-system), TMTD (T-system) and Elemental sulpher + TMTD (M-system). The dielectric behaviour of the tested blends has been studied in the frequency range from 1KHz to 100KHz and in the temperature range from 40C to 140C. It has been observed that samples vulcanized with (T-system) give higher dielectric permittivity values compared with those crosslinked with (S-system) or (M-system). The presence of the polar group C=S in the TMTD molecules is the most effective factor on the dielectric properties of the tested blends. The swelling behaviour and the positron annihilation characteristics by means of Doppler Broadening parameters for the tested blends have been investigated. The positron annihilation characteristics supported the swelling measurements obtained.

THE XXV CONFERENCE ON: ***Solid State Physics and Materials Science***
&
WORKSHOP ON: ***Photonic Materials and Optoelectronic Devices (II)***
6 -10 March 2005 Luxor, Upper Egypt

A 3_{11}

Using Capacitance Measurements to Study Polarization in Mercuric Iodide Radiation Detectors

M. A. Hassan

Electronics Engineering Department, Princess Sumaya University
Amman- Jordan
m.hassan@psut.edu.jo

Mercuric iodide is an interesting material for room temperature X-ray or gamma-ray spectrometers. This is due to its wide band gap (2.13 eV) and its high atomic numbers (80/53). A spectral resolution of better than 4% at Cs^{137} has been reported. Mercuric iodide detectors suffer from polarization i.e., their electrical properties change with time and it will affect and reduce initial high spectral resolution and other electrical properties. This research paper is studying the polarization phenomena using capacitance measurements with low bias voltages and assuming a metal insulator semiconductor (MIS) structure.

THE XXV CONFERENCE ON: ***Solid State Physics and Materials Science***
&
WORKSHOP ON: ***Photonic Materials and Optoelectronic Devices (II)***
6 -10 March 2005 Luxor, Upper Egypt

A 3_{12}

Transport Properties of Ti- and Rh-Doped $RuSr_2GdCu_2O_8$ High-T_c Superconductor

A. Hassen[1*,2], P. Mandal[3], J. Hemberger[2], A. Krimmel[2] and A. Loidl[2]

[1] Physics Department, Faculty of Science, Cairo University, El Fayoum Branch 63514 El Fayoum, Egypt
[2] Experimental Physics, V, Electronic Correlation and Magnetism, University of Augsburg, 86135 Augsburg, Germany
[3] Saha Institute of Nuclear Physics, 1/AF Bidhannagar, Calcutta 7000064, India

Recently, a new class of magnetic superconductors based on layered perovskite rutheno-cuprates $RuSr_2RECu_2O_8$ (Ru-1212RE), where RE is Gd, Eu and Sm, has been synthesized. Ru-1212Gd system has attracted considerable interest because it exhibits a ferromagnetic transition at $T_m \cong 135K$ and bulk superconductivity below $T_c \cong 46K$. For Ru-1212Eu compounds, these transitions are shifted to 133 K and 32 K, respectively. The crystal structure of the Gd- and Eu-based compounds are similar to $REBa_2Cu_3O_{7-\delta}$ (RE-123) superconductors. The structure of Ru-1212RE contains CuO_2 bilayers carrying the superconductivity, while the RuO_2 monolayers which substitute the CuO chains in the RE-123 compounds, and are responsible for the weak ferromagnetism. We report on the transport properties of $Ru_{1-x}M_xSr_2GdCu_2O_8$, with M = Ti and Rh for $0 \leq x \leq 0.2$. The polycrystalline samples are synthesized by conventional solid-state reaction. Both thermoelectric power (*S)* and resistivity (ρ) for all samples are measured and discussed to compared with $Ru(Sr_{1-x}L_x)_2GdCu_2O_8$, where L is La and Na for $0 \leq x \leq 0.10$. Moreover, doping by Co, Ni and Zn at copper site in Ru-1212RE are also performed. It is concluded that the substitution of both Ti and Rh ions at the Ru site in Ru-1212Gd are probably hole doping similar to the substitution of Na ions at the Sr site in the same compounds. On the other hand, the substitution of La at the Sr site is electron doping and has the same effect of transition cations at the Cu site but may be in different mechanism. The behaviour of *S*(T) indicates that Ru-1212RE superconductor is similar to underdoped high-T_c superconductors. The outcome results are summarized in a phase diagram.

A 3_{13}

Phase Stability in Mechanical Alloyed Mn-30at.%Al

S.Ibrahim, A.M.Shamah, A.Hannora, F.F.Hanna ,L.K.Marei, Y.M.Abbas*

Fac.of Pet.& Min.Eng., Suez, Egypt
** Fac. of Sci., Ismaelia, Egypt*

Mechanical alloying of Mn-30at.%Al powder mixture resulted in the formation of a α-Mn solid solution in the early stage of milling with the subsequence formation of β-Mn phase after 30h milling. Thermal treatment at 1060^0C, conformed the recently extension of the high temperature ε-phase. However, the presence of impurities atoms, mainly iron, embedded the expected ε →β transformation during quenching. Such transformation is obtained by annealed metastable ε-phase at 400^0C and to be time dependent. Magnetic properties assessments of both as milled and annealed alloy are carried out.

Session B3

Wednesday, March 9, 2005-02-25
(17:30 – 19:30)

Chairman

Prof. Dr. Mohamed El-Semary
Prof. Dr. Mona Mohsen

THE XXV CONFERENCE ON: ***Solid State Physics and Materials Science***
&
WORKSHOP ON: ***Photonic Materials and Optoelectronic Devices (II)***
6 -10 March 2005 Luxor, Upper Egypt

B 3_1

Effect of Tensile Strain on the Nano-Free Volumes in Carbon Black – Silica – Styrene Butadiene Rubber (SBR) Composites by Means of Positron Annihilation Technique.

M. Mohsen, M. H. Abd El-Salam*, A. Ashry*,
A. Ismail*, M. Salah Abd El-Kerim and H. Ismail*.

Physics Department, Faculty of Science, Ain Shams University, Cairo, Egypt.
**Physics Department, Faculty of Education, Ain Shams University, Cairo, Egypt.*

Positron annihilation lifetime (PAL) spectroscopy has been used to investigate microstructural properties of carbon black – silica – styrene butadiene rubber (SBR) composites. The nano-free volumes calculated from the ortho-positronium lifetime (τ_3) and its intensity (I_3) show a direct dependence on the carbon black type as well as the silica content added to the rubber compound. The effect of tensile strain ($\varepsilon = 0 – 150\%$) on the nano-free volumes has been investigated by constructing a small load frame to permit the measurement of positron lifetime in situ. The variations of the nano-free volumes with deformation are discussed in the frame of free volume theories. A simple illustrative sketch for the rubber – filler matrix is proposed.

THE XXV CONFERENCE ON: ***Solid State Physics and Materials Science***
&
WORKSHOP ON: ***Photonic Materials and Optoelectronic Devices (II)***
6 -10 March 2005 Luxor, Upper Egypt

B 3_2

Physical Properties of Wheat Husk Fibers-Ethylene-Propylene-Diene Terpolymer Composites: I. Effect of Fiber Length and Loading

Maged S. Sobhy, M. T. Tammam and M. A. Ali*

Polymer Phys. Lab., Physics Dept., Faculty of Sci., Cairo University, Beni-Suef Branch, Egypt
** Fundamental Sci. Dept., Industrial Education College, Beni-Suef, Egypt*
MS_Sobhy@yahoo.com

Wheat husk fibers (WHF) filled ethylene-propylene-diene terpolymer (EPDM) was prepared using a laboratory size two-roll mill. Cure characteristics and some physical properties such as swelling, mechanical, and thermal properties of the vulcanizates were studied. Measurements confirmed that WHF tend to agglomerate due to the higher degree of lignin on its surface, which in turn increasing the hydrogen bonding between the fiber surfaces and lowering the area of contacts. The adhesion status between the WHF and rubber matrix are lacked in general, but it started to reinforce the matrix at higher WHF contents where a higher restriction to molecular motion of the macromolecules with uniformed stress distribution of the fibers are produced. From the TGA analysis, a thermally stable property is exhibited, which in turn partially enhanced the reinforcement of the WHF-EPDM composites due to the natural adhesion during vulcanization.

THE XXV CONFERENCE ON: ***Solid State Physics and Materials Science***
&
WORKSHOP ON: ***Photonic Materials and Optoelectronic Devices (II)***
6 -10 March 2005 Luxor, Upper Egypt

B 3_3

Pure Target Fragmentation of P, ^{4}He and ^{7}Li Interactions with Emulsion Nuclei

A. Abdelsalam[(1)], M. S. El–Nagdy[(2)], N. Rashed[(3)] and B. M. Badawy[(4)]

[(1)] Physics Department, Faculty of Science, Cairo University, Giza, Egypt.
[(2)] Physics Department, Faculty of Science, Helwan University, Helwan, Egypt.
[(3)] Physics Department, Faculty of Science, Cairo University, Fayoum Branch, Fayoum, Egypt.
[(4)] Reactor Physics Department, Nuclear Research Center, Atomic Energy Authority, Egypt.
E. Mail: badawyfathalla@hotmail.com

This paper presents exhaustively the general characteristics of the inelastic interactions of P, ^{4}He and ^{7}Li with emulsion nuclei distinguished without relativistic hadrons ($n_s = 0$) in lab. system. The dependence of these interactions on the projectile and target sizes is presented. It is found that, the probability of the events having $n_s = 0$ is dependent on projectile size and incident energy. The average no. of grey particles $< N_g >$ and black particles $< N_b >$ as well as the ratio $< N_g > / < N_b >$ are displayed for different target size. The multiplicity distributions of different target fragments for the events having $n_s = 0$, $n_s > 0$ and those of complete destruction ($N_h \geq 28$) are presented.

THE XXV CONFERENCE ON: ***Solid State Physics and Materials Science***
&
WORKSHOP ON: ***Photonic Materials and Optoelectronic Devices (II)***
6 -10 March 2005 Luxor, Upper Egypt

B 3_4

Gamma- Irradiation Induced Grafted LDPE and PVC Polymers and Their Use in Heavy Metal Removal.

Nabila A. maziad, Magda B. El Arnaouty and El- Sayed A. Hegazy.

Departmenl of polymer chemistry National center for Radiation research and Technology, P.O. Box 29, Nasr City, Cairo, Egypt.

Radiation induced graft copolymerization of methacrylic acid (MAA) onto low density polyethylene (LDPE) and polyvinyl chloride (PVC) was studied the appropriate reaction conditions such as solvent, inhibitor concentration, monomer concentration and irradiation dose at which the grafting process was carried out successfully were selected. The use of ethanol/H mixture as solvent (40/60 wt %) enhanced the grafting process. Cupper 'sulfate was used to minimize the homopolymerization of the monomer and its suitable concentration was found to be (1.8 and 1.0 wt %) respectively, for the grafting onto both LDPE and PVC. The physical properties of the prepared grafted films such as, swelling behavior were studied; it showed that water uptake increases as the degree of grafting increases. The change in chemical structure of polymeric substrates morphology and thermal stability was also determined the possibility of the application of grafted films in adsorption and separation of Cd and Hg metal ion has been studied the ratio of metal uptake and the selectivity of the grafted films towards different metal ion have been investigated. The alkaline treatment enhanced significantly the swelling of grafted films in water.

THE XXV CONFERENCE ON: ***Solid State Physics and Materials Science***
&
WORKSHOP ON: ***Photonic Materials and Optoelectronic Devices (II)***
6 -10 March 2005 Luxor, Upper Egypt

B 3_5

Effect of La-ions on Debye′s Relaxation Time and Activation Energy of $(Pb_{1-1.5x}La_x)TiO_3$ Ceramics

M.K.Gergs

Physics Department, Faculty of Science (Qena),
South Valley University, Egypt.

In The present paper, essentially, the influence of created vacancies on dielectric peaks, Debye′s relaxation time and consequently the activation energy in $(Pb_{1-1.5x}La_x \square_{0.5x})TiO_3$ ceramics was studied. The dielectric measurements have been carried out under electric field with frequencies equal to 1 KHz and 100 KHz. In this paper, the dielectric measurements and the results which were calculated by Debye′s equation for the ferroelectric materials reveal that the sample with x= 20 mole % La characterizes with higher peak for dielectric constant and maximum value of Curie relaxation time. The interpretation of the anomaly peak of dielectric constant of the sample is attributed to the higher concentration of single vacancies at unit cells and the volume of the domain. Also the values of Curie Weiss constants (C^- , C^+) and activation energy as a function of La- content have been determined. The calculated activation energy for the samples depends on the phase transition temperature and Curie Weiss constants.

THE XXV CONFERENCE ON: ***Solid State Physics and Materials Science***
&
WORKSHOP ON: ***Photonic Materials and Optoelectronic Devices (II)***
6 -10 March 2005 Luxor, Upper Egypt

B 3_6

Nano-Free Volume Characterization by Positron Annihilation Lifetime Technique in Fire Retardant Poly (vinylchloride) after Thermal Treatment

M. Mohsen[1], N. Mostafa[1], S. Rashad[2], A. Ayoub[3], E. F. Salem[2] and E. Gomaa[1].

[1]Physics Department, Faculty of Science, Ain Shams University.
[2] Nuclear Regulations and Emergencies Division, Nuclear Center for Nuclear and Radiation Control.
[3] Fire Research Unit, Faculty of Engineering, Cairo University, Gizza, Egypt.

In order to prevent the conversion of electric sparks into a fire and subsequently to prevent the spread of fire throughout a structure, flame retardant materials have been designed for wire, cable insulations and jacketing. PVC is known to be most commonly used material for cable applications. Due to its chlorine content and by the addition of brominates or antimony compounds, flame retardant PVC (FRPVC) can be synthesized. In the present work, flammability tests are performed on the FRPVC materials, that have been used in the construction of the cable insulation and jacketing for the multi-Purpose reactor (MPR) at the Atomic Energy Authority (AEA) of Egypt. The variation of thermal conductivity above glass transition temperature T_g in the temperature range from (30^0C-100 ^{0}C) are deduced and compared with those obtained using non-flame retardant materials. The corresponding variation of nano-size free volumes (100-170 $Å^3$) is determined by means of the positron annihilation lifetime technique. Correlation of these parameters and thermal conductivity has been discussed in terms of phonons as the main heat carriers, where the reduction of the thermal conductivity with temperature could be explained by the interaction phonons wih scattering centers such as impurities, grain boundaries or free volumes.

THE XXV CONFERENCE ON: ***Solid State Physics and Materials Science***
&
WORKSHOP ON: ***Photonic Materials and Optoelectronic Devices (II)***
6 -10 March 2005 Luxor, Upper Egypt

B 3_7

Microstructure Analysis of the Effect of Glass on Polytetrafluoroethylene by Positron Annihilation Spectroscopy

Hamdy F. M. Mohamed, E.E. Abdel-Hady, and Salwa S. Mohamed

Physics Department, Faculty of Science, El-Minia University,
B. O. 61519 El-Minia,Egypt
e-mails: hamdyfm@link.net & esamhady@link.net

The positron annihilation lifetime (PAL) technique has been applied to investigate the free volume holes in pure and glass doped polytetrafluoroethylene with glass as a function of temperature. The measurements were performed from room temperature up to 250 ^{o}C. The observed spectra were decomposed into three components using PATFIT program. The ortho-positronium (o-Ps) lifetime, τ_3 is varying depending upon the phase of the polymer. The data clearly revealed the glass transition temperature, T_g of pure polytetrafluoroethylene (130 ^{o}C). It is observed that, T_g is shifted toward the lower values (110 ^{o}C) for doped polytetrafluoroethylene with glass, which could be attributed to the increase in the degree of crystalinity. This is in consistent with the wide-angle x-ray scattering data. The fractional of the free volume holes were also derived from the positron annihilation parameters. A correlation between the fractional of the free volume holes and conductivity data above T_g was experimentally confirmed.

THE XXV CONFERENCE ON: ***Solid State Physics and Materials Science***
&
WORKSHOP ON: ***Photonic Materials and Optoelectronic Devices (II)***
6 -10 March 2005 Luxor, Upper Egypt

B 3_8

Influence of Fiber-Facet Reflectivity on Operation Characteristics of Vertical-Cavity Surface-Emitting Lasers

[†]Safwat W. Z. Mahmoud, Moustafa F. Ahmed and [‡]Rainer Michalzik
[†]Department of Physics, Faculty of Science, Minia University,
El-Minia, Egypt
Email: safwatwilliam@yahoo.com & m.farghal@link.net
[‡]Department of Optoelectronics, University of Ulm,
D-89069 Ulm, Germany
Email: rainer.michalzik@e-technik.uni-ulm.de

We report experimentally and theoretically on influence of the fiber-facet reflectivity on both steady-state characteristics and dynamics of vertical-cavity surface-emitting lasers (VCSELs). We investigate the coupled optical power into multi-mode fiber under continuous wave (cw) operation and the turn-on dynamics under signal modulation. Although the fiber-facet reflectivity is low, 4%, it generates external optical feedback to the laser cavity, which causes phase variation of the lasing field. The induced phase change causes an interference pattern with a half-wavelength period. When the fiber is located at maxima and minima of this pattern, it causes a change of in the threshold current under cw operation. This change of threshold current induces a change in the turn-on time delay under signal modulation, which may cause dramatic deterioration of the transmitted signal quality in fiber communication systems.

THE XXV CONFERENCE ON: ***Solid State Physics and Materials Science***
&
WORKSHOP ON: ***Photonic Materials and Optoelectronic Devices (II)***
6 -10 March 2005 Luxor, Upper Egypt

B 3_9

Physical Properties of Wheat Husk Fibers-Ethylene-Propylene-Diene Terpolymer Composites: I. Effect of Fiber Length and Loading

Maged S. Sobhy[1], M. T. Tammam[1] and M. A. Ali[2]

[1]Polymer Phys. Lab., Physics Dept., Faculty of Science,
Cairo University, Beni-Suef Branch, Egypt
[2]Fundamental Sci. Dept., Industrial Education College, Beni-Suef, Egypt
MS_Sobhy@yahoo.com

Wheat husk fibers (WHF) filled ethylene-propylene-diene terpolymer (EPDM) was prepared using a laboratory size two-roll mill. Cure characteristics and some physical properties such as swelling, mechanical, and thermal properties of the vulcanizates were studied. Measurements confirmed that WHF tend to agglomerate due to the higher degree of lignin on its surface, which in turn increasing the hydrogen bonding between the fiber surfaces and lowering the area of contacts. The adhesion status between the WHF and rubber matrix are lacked in general, but it started to reinforce the matrix at higher WHF contents where a higher restriction to molecular motion of the macromolecules with uniformed stress distribution of the fibers are produced. From the TGA analysis, a thermally stable property is exhibited, which in turn partially enhanced the reinforcement of the WHF-EPDM composites due to the natural adhesion during vulcanization.

THE XXV CONFERENCE ON: ***Solid State Physics and Materials Science***
&
WORKSHOP ON: ***Photonic Materials and Optoelectronic Devices (II)***
6 -10 March 2005 Luxor, Upper Egypt

B 3_{10}

Study of the Electric Proprerties of Polyacrylamide-Complex Compounds

T.A. Hindia[(1)] M.Y. Abed[(2)], Hilda A. Aziz,[(2)] Wafaa.M. Sayed [(2)] and L.I. Soliman,[(1)]

[(1)] Department of Physics, Lab of Solid State Physics, National Research Centre. Cairo, Egypt
[(2)] Petrochemical Department, Lab of Polymers, Petroleum Research Institute. Cairo, Egypt.

Polyacrylamide with low molecular weight was prepared. The derivatives such as Mercury derivative of acrylamide, Sodium-derivative of acrylamide, n-Bromoacrylamide were prepared. The structural studies of the investigated samples were done using x-ray diffraction analysis. The electrical conductivity of the polymer and its derivatives were measured. The electrical properties of polyacrylamide of low and high molecular weights blended with carbon black were also studied. The effect of the carbon black of the investigated samples on the structure as well as the electrical properties was studied.

THE XXV CONFERENCE ON: ***Solid State Physics and Materials Science***
&
WORKSHOP ON: ***Photonic Materials and Optoelectronic Devices (II)***
6 -10 March 2005 Luxor, Upper Egypt

B 3_{11}

Synthesis of Nanostructured Barium Hexaferrite Powders by Co-precipitation Method

M. M. Rashad, M. Radwan* and M. M. Hessien

Electronic Materials Lab, Advanced Materials Department
Central Metallurgical Research and Development Institute (CMRDI)
P.O. Box 87 Helwan, Cairo, Egypt
radwan72001@yahoo.com

Barium hexaferrite, $BaFe_{12}O_{19}$, is a well-known permanent magnet with superior chemical stability and corrosion resistivity which attracted extensive attention for the last few decades. $BaFe_{12}O_{19}$ is magnetically anisotropic with high intrinsic coercivity (6700 Oe), large saturation magnetization (72 emu/g) and high Curie temperature (450 °C). It was widely used in the fabrication of commercial permanent magnets, data storage applications, high-density perpendicular magnetic and magneto-optic recording media and microwave filters and devices. For ideal performance, ultrafine barium hexaferrite powder with homogeneous and narrow particle size distribution is important. This work reports the synthesis of nano-structured barium hexaferrite powders by the chemical co-precipitation method. Aqueous solutions of barium and ferric chlorides were mixed and the ferrite precursors were obtained by chemical co-precipitation of barium and iron ions using sodium hydroxide solution at room temperature. These precursors were calcined at temperatures of 800–1200 °C for 2 h. The effect of Fe^{3+}/Ba^{2+} mole ratio and addition of various surface active agents on the structural and magnetic properties of produced barium hexaferrite powders were investigated. The formed ferrite powders were characterized by XRD, SEM and VSM techniques. It is found that at the best Fe^{3+}/Ba^{2+} mole ratio (= 8) the surface active agents promote the formation of homogeneous nanopowders (ca. 124 nm) of monophase $BaFe_{12}O_{19}$ at a low temperature as 800 °C with resultant good magnetic saturations (45.13–47.22 emu/g) and intrinsic coercivites (2050–4518 Oe).

THE XXV CONFERENCE ON: ***Solid State Physics and Materials Science***
&
WORKSHOP ON: ***Photonic Materials and Optoelectronic Devices (II)***
6 -10 March 2005 Luxor, Upper Egypt

B 3_{12}

The Effect of Wheat Hay on Carbon Black Loaded EPDM Composite Studied by Positron Annihilation Lifetime Spectroscopy

M.H. Abd-El Salam[1*], E.E. Abdel-Hady[2], Hamdy F. M. Mohamed[2] and A. S. Ibrahim[3]

1 Physics Department, Faculty of Education, Ain Shams University, Cairo, Egypt
2 Physics Department, Faculty of Science, El-Minia University, El-Minia, Egypt
3 Physics Department, Faculty of Science, Cairo University, Giza, Egypt
Email: mh_abdelsalam@lycos.com

The positron annihilation lifetime (PAL) technique has been applied to investigate the behavior of free volume hole in carbon black loaded ethylene propylene diene monomer (EPDM) composite as a function of the wheat hay concentration from 10 to 50 phr. The macroscopic studies including stress-strain, hardness and swelling behavior were measured too. An attempt is done to establish a correlation between the macroscopic measurements and the microscopic properties of the free volume holes. The ortho-positronium (o-Ps) parameters show a compact phase around 20 phr concentration of wheat hay. Such a phase is thought to be responsible for the maximum values of hardness, rupture stress, rupture strain and the minimum in the degree of swelling.

THE XXV CONFERENCE ON: ***Solid State Physics and Materials Science***
&
WORKSHOP ON: ***Photonic Materials and Optoelectronic Devices (II)***
6 -10 March 2005 Luxor, Upper Egypt

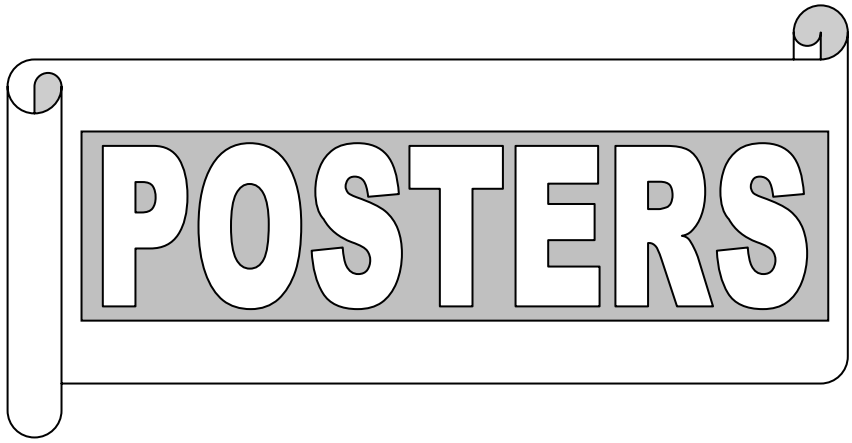
B 3_{13}

Positron Lifetime as a Nanoprobe for Free Volume Distribution in Polyoxymethylene-Copolymer

E. E. Abdel-Hady, Hamdy F. M. Mohamed, and Somia S. Farid

Physics Department, Faculty of Science, El-Minia University, B. O. 61519 El-Minia,Egypt
e-mails: esamhady@link.net & hamdyfm@link.net

Positron annihilation lifetime spectroscopy (PALS) is an effective technique to measure the free volume which is supposed to be connected with the motion of constituents of any glass former. This method is based on a unique ability of the small *ortho*-positronium (*o*-Ps) probe to be localized in the regions of lowered electron density such as vacancies in crystals or the so-called free volume holes in amorphous systems. The positron annihilation lifetime measurements have been carried out to study the free volume properties of polyoxymethylene-copolymer (POM). The effect of temperature changes on free volume hole sizes and hole size distribution has been investigated over the temperature range (5-100 ^{o}C). All PAL spectra were analyzed with LT program which is a finite term lifetime analysis and by MELT which is a continuous lifetime analysis. The free volume sites probed by *o*-Ps increase in size with increasing temperature. PALS measurements revealed the glass transition temperature (T_g) at 15 ^{o}C. Below the glass transition temperature the hole size slowly (linearly) increases with temperatures, while the slop is steeper above T_g. The temperature of this transition as measured by PALS has turned out to be somewhat lower than what is obtained with differential scanning calorimetry (DSC). At room temperature the results show a narrow distribution, reflecting that the free volume holes are small and of rather equal size. As the temperature is raised, the distribution broadens. The largest change in distribution width will be discussed on the frame of the free volume model.


POSTERS

THE XXV CONFERENCE ON: ***Solid State Physics and Materials Science***
&
WORKSHOP ON: ***Photonic Materials and Optoelectronic Devices (II)***
6 -10 March 2005 Luxor, Upper Egypt

P01

Assessment of Dissimilar Weld Joint of Boiler Ferritic Steel Using Austentic Stainless Steels Electrodes

M. Shafy and I. Soliman

Atomic Energy Authority, Nasr City, Cairo, Egypt

The microstructure and mechanical properties of dissimilar weld joints, using different types of austentic stainless steel electrodes to join ferritic steel plates are evaluated. The ferritic steel steel of type17MN4, DIN17155 is frequently used in manufacturing boilers. The austentic stainless steel electrodes of types AWS E309L-16 and AWS E308L-16 could be used to weld dissimilar ferritic/austentic material or for repair by welding processes. These electrodes are used to join the above mentioned ferritic steel type. The Welding was performed using shielded metal arc welding process (SMAW). Tensile and impact properties were determined for both weld joints in the as-welded condition and after post weld heat treatment (PWHT) for 2,10,50 and 100 hrs at 580 ºC . Optical and scanning electron microscopy were used to characterize the microstructure of the weld interface and fracture surface morphology.

THE XXV CONFERENCE ON: ***Solid State Physics and Materials Science***
&
WORKSHOP ON: ***Photonic Materials and Optoelectronic Devices (II)***
6 -10 March 2005 Luxor, Upper Egypt

P02

Suppression of Superconductivity in $(Tl_{1-x}M_x)$ $Ba_2Ca_2Cu_3O_{9-\delta}$ Where M=Nd

N. H. Mohammed

Physics Department, Faculty of Science, Alexandria University, Alexandria, Egypt
E-mail: nsharaf@hotmail.com

The effect of Nd substitution for Tl in the $Tl\,Ba_2\,Ca_2\,Cu_3\,O_{9-\delta}$ has been studied. Superconducting samples of type $(Tl_{1-x}M_x)Ba_2Ca_2Cu_3O_{9-\delta}$ where M=Nd, with $0.0 \leq x \leq 0.5$ have been prepared and characterized using X-ray powder diffraction, scanning electron microscope and electrical resistivity measurements. The Nd substitutions for Tl results in an increase in the transition temperature T_c till $x = 0.1$, followed by a decrease in its value for $x > 0.1$ and the superconductivity is completely destroyed at $x_c = 0.5$. The transition width ΔT, the normal resistivity ρ_n (ρ at $T = 297$ K), resistivity temperature coefficient B and residual resistivity ρ_0 are found to increase with increasing x. These results are related to the suppression of superconductivity. This suppression is discussed according to different mechanisms such as the hole filling, the magnetic scattering and the disorder in the internal magnetic moment.

P03

Physical Properties of Stacked $CuInSe_2$ Thin Films

A. Ashour

Faculty of Science, Physics Department, Minia University, Minia, Egypt

Semiconducting thin films of $CuInSe_2$ have been grown by thermal annealing in air of evaporated layers of Cu, In and Se on glass substrates. The structure of the films has been studied using the X-ray diffraction. The films were polycrystalline and showed mixed phases (ternary and binary) depending on the annealing temperature. The electrical properties revealed resistivity range of $10\text{-}10^4$ Ω cm respectively. The resistivity is affected by the heating time and decreased with raising temperature. The films have been investigated for optical band gap determination.

P04

Physical Characteristics of Thermally Evaporated Bismuth Thin Films

N. Z. El-Sayed

Physics Department, Faculty of Science, Minia University, Minia, Egypt

Thin films of bismuth (Bi) with different thicknesses were produced by thermal evaporation technique from a molybdenum boat source on cleaned glass substrates at room temperature. The material has been characterized by X-ray diffraction, electrical and optical measurements. A phase of polycrystalline transition was observed. The resistivity is calculated for different film thicknesses at room temperature. The film thickness of Bi films and the temperature are found to be parameter affecting these values. Anomalous dependence of resistivity on temperature was observed during heating. The optical constants are determined from the transmission and reflection data of these thin films for normal incidence. The absorption coefficient revealed the existence of an allowed direct transition with energy gap (Eg) equals 3.45, 3.5 and 3.6 eV.

P05

Preparation of ZnO – Doped Al Films by Spray Pyrolysis Technique

M. A. Kaid

Physics Department, Faculty of Science, Minia University, Minia, Egypt

Al-doped zinc oxide (AZO) thin films have been prepared by spray pyrolysis (SP) technique of zinc acetate and aluminium nitrate. The effect of thickness on structural and optical properties has been investigated. The structural and optical characteristics of the AZO films were examined by X-ray diffraction (XRD) and double-beam spectrophotometry. The films, deposited on glass substrates at an optimal substrate temperature (T_s = 450 ^oC), have a polycrystalline texture with a hexagonal structure. Transmission measurements showed that for visible wavelengths, the AZO films have an average transmission of over 90%. The optical parameters have been calculated. The dependence of the refractive index, n, and extinction coefficient, k, on the wavelength for the sprayed films is also reported. The optical bandgap of AZO is between 3.30 and 3.55 eV, depending on the film thicknesses.

P06

Ethyl 4-(4-Florophenyl)-6-Phenyl-2-Substituted-3-Pyridine Carboxylates

A. M. Moustafa[1*], El-Sayed M. Shalby[1], A. M. Elshabiny[1], A. A. Ramadan[2], I. S. Ahmed Farag[1] and Adel S. Girgis[1]

[1]Physics Department, National Research Centre
[2]Physics Department, Faculty of Science, Helwan University
aishamoustafa@yahoo.com

Three substituted pyridinecarboxylate were synthesized; (I) Ethyle 2-bromo-4-(4-fluorphenyl)-6-phenyl-3-pyridinecarboxylate, $_0H_{15}BrFNO_2$, (II) Ethyle 4-(4-fluorphenyle)-2-(4-morpholinyle)-6-phenyl-3-pyridinecarboxylate, $C_{25}H_{25}FN_2O_2$ and (III) Ethyle 4-(4-fluorphenyle)-6-phenyle-2-(1-piperdinyle)-3-pyridinecarboxylate, $C_{24}H_{23}FN_2O_3$. It was found, that compound (I) belongs to the orthorhombic system with space group $P2_12_12_1$, compound (II) to the monoclinic system with space group $P2_1/c$ and compound (III) to the monoclinic system with space group C2/c.The morpholine ring in (II) and piperidine ring in (III) have the shape of the distorted chair configuration.

P07

Absorption and Infrared Spectra of Gamma Irradiated Ternary Silicate Glasses Containing Cobalt

Fatma H.A.El Bata1[l], N. Nada[1] S.M.Desouky[2,] and Magda M.I.Khalil[3]

[1] Glass Research Department, National Research Center, Dokki, Cairo, Egypt
[2] Physics Department Faculty of Girls, Ain Shams University, Cairo, Egypt
[2] Radiation Physics Department National Center for Radiation, Research & Technology Nasr City, Cairo, Egypt
maimaher20005@hotmail.com*

Optical and infrared absorption spectra of undoped ternary silicate and CoO doped glasses were measured before and after successive gamma ray irradiation. The results obtained revealed the existence of cobalt ions mainly in tetrahedral coordination in such host glasses. The radiation-induced defects created by gamma irradiation are related to intrinsic effect of the glass constituents and extrinsic effect due to the cobalt ions. The response of the glass to irradiation and the growth rate of color centers are related to the equilibrium between the formation and annihilation processes of induced color centers and the saturation or equilibrium state reached by successive irradiation.

P08

Temperature and Dwell Time Effect on Hardness of Al-base Alloys

F.Abd El-Salam[1], L.A.Wahab[2], R.H.Nada[1] and H.Y.Zahran[1]

1 Physics Department,Faculty of Education, Ain Shams University, Cairo, Egypt.
2 National Centre for Radiation Research and Technology, Nasr-City, Cairo, Egypt.
Email:radwanhnada@Yahoo.com

The hardness of Al-5wt%Zn (alloy A) and Al-5wt%Zn-0.25wt%In (alloy B) was measured at room temperature for samples heat treated in the range 300-453 K and dwell times in the range 30-300 sec. under 50 gm load. Softening was observed for all the samples and the hardness decreased with increasing temperature and/or dwell time. Hardness drop was larger for alloy (B), which in general showed higher hardness than alloy(A). The stress exponent n increased with increasing temperature and showed high values falling in the power law breakdown region. The parameters deduced from the analysis of x-rays data were found to consist with the calculated mechanical data.

P09

Comparison Structure and Magnetic Study of Nano-Composite Fe_2O_3: $BaTiO_3$ Prepared With sol-gel and Spray Pyrolysis Techniques.

H. H. Afify, I. K. Battisha and I. M. M. Moussa

National Research Center, Department of Solid Satate Physics,
Giza, Egypt.
passtkouine55@yahoo.com

Nano-structure $BaTiO_3$ doped with Fe_2O_3 have been prepared by two different techniques, spray pyrolysis and sol-gel. Nano-structure pure barium titanate and incorporated with 30 % of Fe_2O_3 in the form of powder and thin film have been prepared by sol-gel technique, using barium acetate ($Ba(Ac)_2$), and titanium butoxide ($Ti(C_4H_9O)_4$), as precursors. The thin films were prepared by spin coating sol-gel method. The as-grown thin films and powders were found to be amorphous, which crystallized to the tetragonal phase after being synthesized at 750^oC in air for 30 minutes. These data was compared to the data obtained by preparing the thin film by spray pyrolysis technique using the same precursors and was found nearly the same. The crystallite sizes of thin film and powder prepared samples both technique SP and Sol-gel, was found to be equal to = 16 and 10 nm, respectively for doped materials. The XRD data were confirmed by transmission electron microscope TEM. This high dielectric constant is bellieved to arise from the increase of both of the XRD intensity and the crystallite size, in increasing the concentration of Fe_2O_3. The magnetic properties were compared.

THE XXV CONFERENCE ON: ***Solid State Physics and Materials Science***
&
WORKSHOP ON: ***Photonic Materials and Optoelectronic Devices (II)***
6 -10 March 2005 Luxor, Upper Egypt

P10

Some Ferroelectric Properties and Activation Energy of $[(Pb_{1-x}\ Sr_x)_{1-1.5z}La_z]TiO_3$ Ceramics

M.K.Gergs , G.A.Gamal, and M.A.Massaud

Physics Department, Faculty of Science (Qena), South Valley University, Egypt.

The main aspect of this paper is to reveal the proper concentration of Sr and La - content which provides the samples of $[(Pb_{1-x}\ Sr_x)_{1-\ 1.5z}La_z]TiO_3$ ceramics with optimum ferroelectric properties. The samples in this paper are classified into three groups according to the concentration of La-content. The dielectric measurements have been carried out under electric field with frequencies equal to 1 KHz and 100 KHz. The samples of the first group (z=3 mole % La) exhibited two anomalies peaks for dielectric constant at x= 20 and 40 mole %Sr. The samples of second group (z= 6 mole%La) showed the similar behavior but the anomalies peaks for dielectric constant at x= 25 and 35 mole %Sr. The samples of third group (z=9 mole %La) characterizes with only one anomaly peak for dielectric constant at x= 30 mole %Sr .The results showed an increase at the value of anomaly peak for dielectric constant with increasing the concentration of vacancies which are created from the substitution of La -ion in Pb - or Sr- site in $[(Pb_{1-x}\ Sr_x)_{1-\ 1.5z}La_z\square_{0.5z}]\ TiO_3$ ceramics . The interpretation of the anomalous behavior of dielectric properties for previous samples is attributed to increasing the volume of the domain. The relation between Curie temperature T_c and the concentration of Sr- ions in this experiment decreased linearly. The experimental value of T_c is in agreement with the calculated value according to the basis of the binomial distribution function. In this paper, values of Curie Weiss constants (C^- , C^+), Debye′s relaxation time and activation energy as function of Sr-content have been determined.

P11

Biophysical and Biochemical Alterations After Exposure to 3 Gauss Electro-Magnetic Field

H. Abdel Baieth[1], M. Abdel-Rahman[2], O. Abdel-Salam[3]

Physics Department., Faculty of Science, Banha[1],
Clinical Pathology Lab., Student Hospital, Cairo University[2] Department of Pharmacology[3], and National Research Centre, Dokki.

Exposure to electromagnetic (EMF) fields of varying intensity became an inescapable fact in human daily life. With increased exposure levels much concern arises as regards their effects on human health. In the present study, the effect of exposure to 2 or 3 Gauss EMF were assessed in rats on the basis of physical parameters and biochemical markers in serum. **Methods:** groups of 6-7 rats were subjected to 3 Gauss EMF for 21 days. The effect of GbE (25 mg/kg) administered orally daily for 7 days either prior to- or after exposure to 3 Gauss EMF.was also studied. Osmotic fragility and solubilization of RBCs, blood elements were determined. In addition, the levels of the hepatocellular enzymes aspartate aminotransferease and alanine aminotransferase, bilirubin, glucose, urea, creatinine and total proteins were measured in serum. **Results:** Solublization of RBCs, number of erythrocytes and white blood cells were increased after exposure to EMF. Levels of aspartate aminotransferease increased, while those of alanine aminotransferase decreased in serum. Serum total bilirubin noticeably increased after EMF exposure. The alterations in hepatoceuular enzymes and bilirubin were normalized if GbE was administered prior to EMF exposure. The number of erythrocytes was also decreased to normal values with prior treatment with GbE. **Conclusions:** the present findings suggest that exposure to EMF of 3 Gauss induced alterations in blood elements and hepatic function and indicate the need for further research in this field. Results also suggest that anti-oxidants might be of some value in reducing or preventing the biological alterations caused by EMF in view of the beneficial effects observed in the present study with GbE.

P12

Growth and Characterization of Ternary compound $TlInSe_2$ Single Crystals

H.T. Shaban*, M. Mobark, M.M.Nassary

Physics Departement, Faculty of Science, South Valley Uni., Qena, Egypt.
htsh2@Yahoo.com

Electrical conductivity, Hall effect and thermoelectric power were performed on single crystals of $TlInSe_2$ in a wide range of temperature. The crystals were grown by melt growth technique. From electrical and Hall effect measurements, the conductivity type, the energy gap, Hall mobility, and carriers concentration were determined. Different physical parameters were estimated from thermoelectric power measurements such as effective mass of charge carriers, carrier mobility, diffusion length, and relaxation time for both majority and minority carriers.

P13

Elecrical and Thermoelectric Power Measurements of the $GaInSe_2$ Semiconductor

M. Mobark

Physics Departement, Faculty of Science,
South Valley, Uni., Qena, Egypt.
moustafff@yahoo.com

Single crystal of $GaInSe_2$ was grown from melt using a vertical Bridgman technique. In this work we measured the temperature dependance of DC electrical and thermoelectric-power of $GaInSe_2$ single crystals at temperature range from 123K to 573K. Thermoelectric-power probe testing confirm that all our investigated crystal samples are p-type conductivity. From the electrical conductivity and Hall effect we obtained the energy gap, the mobility of hole and the concentration of hole at room temperature. From both Hall effect and thermoelectric-power measurements we calculated some important factors such as the effective mass of hole and electron, the hole and electron diffusion coefficients, the relaxation times for the majority and minority carriers and the diffusion length for holes and electrons.

P14

Transport properties of Bi_2S_3 single crystals

M.M.Nassary, H.T. Shaban*, and M.S.El-Sadek

Physics Departement, Faculty of Science,
South Valley Uni., Qena, Egypt.
htsh2@Yahoo.com

Measurements of the electrical conductivity, Hall effect and thermoelectric power were carried out in a wide temperature range for Bi_2S_3 crystals. The crystals were grown in single crystalline form by a modification of the Bridgman method. These measurements were carried out in two crystallographic directions (parallel and perpendicular to the *c*-axis). The measurements showed that, the electrical conductivity, Hall mobility and Seebeck coefficient were anisotropic nature. The conductivity type was found to be n-type. Values of the energy gap were found to be different in both two directions. Throughout the joining between the electrical and thermoelectric power measurements many physical parameters were estimated such as effective mass of charge carriers, carrier mobility, diffusion length, diffusion coefficient and relaxation time for both majority and minority carriers.

P15

On Creep Behavior of Copper Nano-Powders Reinforced Tin-Antimony Conventional Solder

M.A. Abo-Elsoud, Maged S. Sobhy[#], and M. T. Tammam

Materials Sci. Lab., Department of physics, Faculty of Science,
Cairo University, Beni-Suef Branch, Egypt
ms_sobhy@yahoo.com

Creep behavior of composite solders that prepared by the addition of copper nanopowders (average particle size 100 nm) to the blend of an eutectic solder tin (Sn)-antimony (Sb) was investigated. The blended solder was exhibited an universal pseudogap behavior at the vicinity of the phase transformation temperature point ($T \cong 443$ K) where the copper powders are precipitated as intermetallic compound that are distributed nonuniformly through the pseudogap of the microstructure. The strain rate sensitivities and the apparent activation energies were determined to characterize the dislocation climb along the grain boundaries and the diffusion of Cu precipitates in the Sn-Sb phase. X-ray analysis confirmed the universal pseudogap behavior during the creep process.

P16

Intermetallic Compound Kinetics of Al-Cu Alloys During Tensile Tests

Mohamed A. Abo-Elsoud, Maged S. Sobhy, Mahmoud A. Shafy*, and H. Ismail

Materials Sci. Lab., Physics Department, Faculty of science, Cairo University, Beni-Suef, Egypt.
**Assurance and Quality Control Dept., NCNSRC, AEA, Nasr City, Cairo, Egypt.*
ms_sobhy@yahoo.com

The stress-strain characteristics of Al alloys containing 0.03, 0.05 and 0.10 at.% Cu were investigated at room temperature and at higher temperatures over a stress range of 0.5 to 15 MPa. It is found that the mechanical behavior of the alloys is strongly influenced by the role of Cu concentration, where the addition of copper in small amounts may modify the structure of the binary alloys and markedly enhance es the fracture strength of the materials. The strain hardening exponents of these alloys decrease dramatically during the elastic to plastic transition. Taking into account, the existence of a strongly temperature dependent threshold stress a more realistic value of the activation enthalpy corresponding to that of the bulk diffusion can be assessed.

THE XXV CONFERENCE ON: ***Solid State Physics and Materials Science***
&
WORKSHOP ON: ***Photonic Materials and Optoelectronic Devices (II)***
6 -10 March 2005 Luxor, Upper Egypt

P17

Investigation of $GeSe_2$ Films by AC Conductivity, Photodarkening and Electron Spin Resonance

L.A. Wahab*, A. Adam, K. Sedeek, M. R. Balboul*,
A. A. El-ela, A. N. Makram,

**National Center for Radiation Research and Technology, P.O.Box 29 Nasr City, Cairo, Egypt*
Physics Department, Faculty of Science (Girls Branch) Al-Azhar University, Cairo, Egypt.

Photodarkening experiments have been performed on evaporated films of $GeSe_2$ using He-Ne Laser. This study argues the coexistence of two processes: reversible and irreversible. The former is related to defects located in energy at the band edge and is confirmed by the blue shift of the band edge and the restoration of the initial optical gap value by annealing. The irreversible process, on the other hand, results from defects situated in energy into the band tails. These defects cause a considerable additional absorption below the band edge and a remarkable decrease of the refractive index. Electron spin resonance experiments detect intrinsic free spin centers (C^o) at g = 2.0064 in the as deposited film. No induced ESR signal is detected by laser irradiation. The ac conduction mechanism of the films under study is interpreted via single electron transfer between the $C^-_1(C^+_3)$ and C^o centers. The non-paramagnetic defects associated with the photodarkening effect are assumed to originate from topological changes such as bond length, bond angle and bond configuration.

P18
On-line nuclear Ash Gauge for Coal Based on Gamma-ray Backscattring Techniques

A. T. Matar, R. A. M. Rizk, A. F. Hassan and A. A. Abdel Alim.

Physics Department, Faculty of Science, Helwan University, Ain Helwan, Cairo, Egypt

Applications of on-line nuclear gauges in the coal industry are highly requested. In this work, a nuclear ash gauge for coal, based on the simultaneous measurement of the 0.511 MeV annihilation radiation and the Compton backscattered gamma rays, which are resulted from an irradiation of the coal with gamma photons at energies greater than 1.022 MeV, (PP gauge). The PP gauge could be improved by separating the calculations of the annihilation radiation from that of the Compton backscattered gamma rays that scattered by different thicknesses of coal sample, this method leads to minimize the r. m. s. deviations between chemical laboratory ash and ash measured on the backscatter gauge. The techniques have been tested by laboratory measurements on 13 bulk coal samples, each weighting 50 kg. These measurements were performed using a ^{60}Co source and 3" × 3" NaI(Tl) detector in a backscatter geometry.