

INDIAN VACUUM SOCIETY SYMPOSIUM ON THIN FILMS: SCIENCE & TECHNOLOGY

Mumbai, India 9 – 12 November 2011

EDITORS

Dr. N. K. Sahoo
Dr. D. Udupa
Dr. D. Bhattacharyya

Bhabha Atomic Research Centre, Mumbai, India

All papers have been peer reviewed.

SPONSORING ORGANIZATIONS

Board of Research in Nuclear Science (BRNS)
Department of Science & Technology (DST)
Indian Space Research Organization (ISRO)
Indian National Science Academy (INSA)

AIP
American Institute
of Physics

Melville, New York, 2012

AIP | CONFERENCE PROCEEDINGS ■ 1451

Editors

Dr. N. K. Sahoo
Dr. D. Udupa
Dr. D. Bhattacharyya

Applied Spectroscopy Division
Bhabha Atomic Research Centre
Mumbai – 400 085
India

E-mail: nksahoo@barc.gov.in
dudupa@barc.gov.in
dibyendu@barc.gov.in

Authorization to photocopy items for internal or personal use, beyond the free copying permitted under the 1978 U.S. Copyright Law (see statement below), is granted by the American Institute of Physics for users registered with the Copyright Clearance Center (CCC) Transactional Reporting Service, provided that the base fee of \$30.00 per copy is paid directly to CCC, 222 Rosewood Drive, Danvers, MA 01923, USA: <http://www.copyright.com>. For those organizations that have been granted a photocopy license by CCC, a separate system of payment has been arranged. The fee code for users of the Transactional Reporting Services is: 978-0-7354-1050-3/12/\$30.00

© 2012 American Institute of Physics

No claim is made to original U.S. Government works.

Permission is granted to quote from the AIP Conference Proceedings with the customary acknowledgment of the source. Reproduction of an article or portions thereof (e.g., extensive excerpts, figures, tables, etc.) in original form or in translation, as well as other types of reuse (e.g., in course packs) require formal permission from AIP and may be subject to fees. As a courtesy, the author of the original proceedings article should be informed of any request for republication/reuse. Permission may be obtained online using RightsLink. Locate the article online at <http://proceedings.aip.org>, then simply click on the RightsLink icon/“Permissions/Reprints” link found in the article abstract. You may also address requests to: AIP Office of Rights and Permissions, Suite 1N01, 2 Huntington Quadrangle, Melville, NY 11747-4502, USA; Fax: 516-576-2450; Tel.: 516-576-2268; E-mail: rights@aip.org.

L.C. Catalog Card No. 2012935202
ISBN 978-0-7354-1050-3
ISSN 0094-243X
Printed in the United States of America

AIP Conference Proceedings, Volume 1451
Indian Vacuum Society Symposium on Thin Films: Science & Technology

Table of Contents

Preface: Indian Vacuum Society Symposium on Thin Films: Science & Technology N. K. Sahoo, D. V. Udupa, and D. Bhattacharyya	1
INVITED TALKS	
Quantitative MCs_n^+ - SIMS for direct compositional analysis of interfaces of low-dimensional structures Purushottam Chakraborty	5
Molecular imaging of chemical species adsorbed on solid surfaces by scanning probe microscopy Masaharu Komiyama, Manish Sharma, and James R. Engstrom	12
MOVPE and MBE growth of semiconductor thin films Tarun Kumar Sharma	18
Non evaporable getter (NEG) technology: A powerful tool for UHV-XHV systems Enrico Maccallini, Fabrizio Siviero, Antonio Bonucci, Andrea Conte, Peeyush Srivastava, and Manini Paolo	24
Nanocrystalline silicon based thin film solar cells Swati Ray	28
Thin solar cell technologies - Current status Viresh Dutta	33
Plasma deposition of thin film multilayers for surface engineering R. Bhattacharyya and Sushil Kumar	38
Interface-induced superconductivity in Pd films on SrS C. Sürgers, A. Cosceev, H.-G. Boyen, and H. V. Löhneysen	43
Magnetic and magnetotransport properties of metallic multilayers M. Senthil Kumar	48

CONTRIBUTARY ORAL PRESENTATIONS

Probing spectroscopic like information using resonant scattering M. Nayak and G. S. Lodha	55
Au-nanoparticles-decorated MWCNTs demonstrating enhanced fluorescence and Raman spectroscopy Himani Sharma, Vishakha Kaushik, D. V. Avasthi, A. K. Shukla, and V. D. Vankar	58
ZnO nanowires coated with CuO films as highly sensitive H₂S sensors Niyanta Datta, N. S. Ramgir, Manmeet Kaur, A. K. Debnath, D. K. Aswal, and S. K. Gupta	61
Comparison of magnetization and magnetoresistance in Co/Cu multilayers P. B. Patil, M. Senthil Kumar, D. K. Aswal, and S. K. Gupta	64
Effect of ferrite layer thickness on the magnetic properties of SnO₂/Cu-Zn ferrite multilayer S. Saipriya, Joji Kurian, and R. Singh	67
Reproducible bulk heterojunction polymer solar cell arrays P. Veerender, A. K. Chauhan, Vibha Saxena, P. Jha, D. K. Aswal, and S. K. Gupta	70
Effects of metal nanodots (Au and Pd) on Nb₂O₅ memristors M. K. Hota, M. K. Bera, S. Mallik, and C. K. Maiti	73
Laser induced damage threshold studies of HfO₂-SiO₂ composite thin films R. B. Tokas, N. M. Kamble, S. Jena, S. Thakur, A. K. Poswal, and N. K. Sahoo	76
Development of W/C soft x-ray multilayer mirror by ion beam sputtering (IBS) system for below 50Å wavelength A. Biswas and D. Bhattacharyya	79

CONTRIBUTORY POSTER PRESENTATIONS

The effect of indium composition on open-circuit voltage of InGaN thin-film solar cell: An analytical and computer simulation study Omkar Jani, Pramila Mahala, Sanjay Kumar Behura, Abhijit Ray, and Chenna Dhanavatri	85
Characterization of chemically grown nanostructured NiFe₂O₄ thin films C. D. Lokhande, V. S. Jamadade, S. N. Pusawale, and H. M. Pathan	88

Determination of the $\mu\tau$ products of nanocrystalline CdSe: Cu thin films using photocurrent spectroscopy	
Alaa S. Al-Kabbi, Kriti Sharma, G. S. S. Saini, and S. K. Tripathi	91
Synthesis of BiFeO₃ thin films by chemical solution deposition – Structural and magnetic studies	
S. Angappane and Nagaiah Kambhala	94
A study of the applicability of ZnO thin-films as anti-reflection coating on Cu₂ZnSnS₄ thin-films solar cell	
Abhijit Ray, Malkeshkumar Patel, Brijesh Tripathi, and Manoj Kumar	97
Effect of oxygen partial pressure on the structural and electrical properties of DC sputtered (Ta₂O₅)_{0.85}(TiO₂)_{0.15} thin films on Si	
S. Uthanna and M. Chandra Sekhar	100
Effect of film thickness on luminescence property of CsI: Tl	
S. C. Gadkari, Seema Shinde, G. D. Patra, S. G. Singh, and Shashwati Sen	103
Growth and characterization of Cu₂SnS₃ thin films by spray pyrolysis	
V. Sundara Raja, U. Chalapathi, and S. Uthanna	106
Metal insulator transition in Ga doped ZnO thin films	
R. V. Muniswami Naidu, Aryasomayajula Subrahmanyam, Arnaud Verger, M. K. Jain, S. V. N. Bhaskara Rao, S. N. Jha, and D. M. Phase	109
Optimization of device quality silicon hydrogen alloy materials from plasma emission diagnostics and its application to solar cell	
Animesh Layek, Somnath Middy, and Partha Pratim Ray	112
Thin films of alkali metal ion-human angiotensin I in native and denatured conformational state probed by MALDI-TOFMS	
T. Jayasekharan and N. K. Sahoo	115
Synthesis and characterization of semiconducting BC films for neutron sensors by pulse DC plasma CVD	
S. K. Ghosh, P. Mishra, C. Srivastava, R. K. Choudhary, and A. C. Bidaye	118
Crystallographic phase control of TiO₂ in thin films deposited by asymmetric bipolar pulsed DC sputtering	
P. R. Sagdeo, Sekh Maidul, D. D. Shinde, J. S. Misal, S. Thakur, N. K. Sahoo, A. Sagdeo, S. Rai, C. Mukherjee, K. Rajiv, V. G. Sathe, and M. Gupta	121
Study of coercive fields and K_{β}/K_{α} X-ray intensity ratios of nickel films in the thickness range of 5-2000 nm	
C. L. Prajapat, M. R. Singh, G. Ravikumar, S. K. Gupta, D. Joseph, B. K. Nayak, and A. Saxena	124

Magnetic properties of BiFeO₃ with ZnO buffer layer S. Angappane, R. Rajalakshmi, and Nagaiah Kambhala	127
Influence of heat treatment on the optical properties of GeSe₂ thin films R. T. Ananth Kumar and D. Pathinettam Padiyan	130
Diamond like rod-shaped carbon nanostructures grown by microwave plasma CVD S. K. Pradhan, Sambita Sahoo, and P. K. Barhai	133
A comparison study of two different techniques to grow ZnO thin films for gas sensor application S. B. Majumder, S. Pati, and P. Banerji	136
Optical characteristics of pulsed laser deposited Ba_{0.8}Sr_{0.2}TiO₃ thin films grown on fused quartz substrate N. Roy, M. Nath, A. Roy, S. K. Ray, and A. Dhar	139
Effects of annealing on the structure and optical properties of alumina films deposited by electron beam evaporation P. Nayar, A. Khanna, and D. Kabiraj	142
Growth study of ion assisted evaporated molybdenum thin films P. K. Yadav, M. Nayak, G. S. Lodha, and S. Rai	145
Modification in surface morphology and enhanced field emission properties of pristine carbon nanotubes by introducing nitrogen gas Vishakha Kaushik, Himani Sharma, A. K. Shukla, and V. D. Vankar	148
Fabrication and evaluation of large area soft X-ray multilayer mirrors P. N. Rao, M. Nayak, G. S. Lodha, S. K. Rai, A. K. Srivastava, M. H. Modi, and A. Sagdeo	151
Magnetron sputtering system for fabrication of X-ray multilayer optics M. Nayak, P. N. Rao, and G. S. Lodha	154
ZnO nano flowers formation by microwave assisted chemical bath deposition technique J. R. Mahajan	157
Simulation of thickness and optical constants from transmission spectrum of thin film by envelope method: Practical constraints and their solution Sekh Maidul, D. D. Shinde, J. S. Misal, Nisha Prasad, P. R. Sagdeo, and N. K. Sahoo	160
Study of structural property of Co ferrite thin film grown by pulsed laser deposition technique Razia Nongjai, Shakeel Khan, Hilal Ahmad, Imran Khan, and K. Asokan	163
Effect of self assembled monolayer modification of SiO₂ dielectric on the performance of copper phthalocyanine organic thin film transistor N. Padma, A. K. Chauhan, S. K. Gupta, and V. Sudharshan	166

Fabrication of multiferroic GdMnO₃ thin film by pulsed laser deposition technique Puneet Negi, H. M. Agrawal, R. C. Srivastava, and K. Asokan	169
Structure and crystallization study of phase change thin Ge-Sb-Te films R. Thangaraj, Sandeep Kumar, Digvijay Singh, and Sharanjit Sandhu	172
Influence of substrate bias voltage on the properties of sputtered nickel oxide thin films A. Mallikarjuna Reddy, Ch. Seshendra Reddy, Y. Ashok Kumar Reddy, R. Lydia, P. Sreedhara Reddy, and A. Sivasankar Reddy	174
Formation of CdSe/CdTe quantum dots in multilayer thin films using PVD method M. Melvin David Kumar, Suganthi Devadason, and S. Rajesh	176
Reactive nitrogen sputtering of iron using ion beam and magnetron sources Mukul Gupta, Akhil Tayal, Ajay Gupta, Jochen Stahn, and M. Horisberger	179
Deposition of a nickel film by DC magnetron sputtering and its characterization M. Swain, D. Bhattacharya, K. G. Bhushan, and S. Basu	182
Ammonia sensor based on WO₃ thin films Niranjan Ramgir, Niyanta Datta, Manmeet Kaur, S. Kailasaganapati, A. K. Debnath, D. K. Aswal, and S. K. Gupta	185
Effect of deposition pressure on composition, structure and magnetic properties of Sm-Co films P. Saravanan, S. V. Kamat, B. Sreedhar, and A. Perumal	188
Gas sensing properties of zinc oxide thin films prepared by spray pyrolysis Onkar Singh, Nipin Kohli, Manmeet Pal Singh, Kanika Anand, and Ravi Chand Singh	191
Electrodeposition of copper selenide films from acidic bath and their properties Rajaram S. Mane, Arif V. Shaikh, Oh-Shim Joo, Sung-Hwan Han, and Habib M. Pathan	194
Structural, optical and electrical properties of vacuum evaporated PbSe/ZnSe multilayer thin films S. Rajesh, V. Arivazhagan, and M. Manonmani Parvathi	197
Effect of film thickness on surface morphology and optical properties of nanostructured Zinc Aluminum Oxide thin films deposited by DC magnetron sputtering B. Rajesh Kumar and T. Subba Rao	200
A study of vacuum evaporated Al/Cds/Al thin film sandwich structure as capacitive type temperature transducer S. B. Iyer, S. A. Sayyed, and G. R. Bhand	203

Preparation and characterization of vacuum evaporated SnSe and SnSe₂ multilayer thin films S. Rajesh, M. Manonmani Parvathi, A. Mohan, and V. Arivazhagan	206
Electrical properties of ultra thin ZrO₂ films on ZnO/Si_{1-x}Ge_x heterolayers S. K. Nandi, Broja G. Dutta, and S. S. Mahato	209
Effect of thickness on structure and optical properties of RF-sputtered Zn_{0.925}Mn_{0.025}Fe_{0.05}O thin films R. Singh and M. Venkaiah	212
Structural and optical properties of polymer composites/porous silicon B. Natarajan, K. Kulathuraan, J. Pandiarajan, N. Prithivikumar, and N. Jeyakumar	215
Development of UHV compatible, cylindrical magnetron sputtering system for NEG coating S. K. Shukla, B. K. Sindal, Tripti Bansod, and Kvanps Kumar	218
Formation of PdS and PdS₂ phases by sulfurization of sputtered Pd thin films Ranu Bhatt, Shovit Bhattacharya, Ajay Singh, Ranita Basu, D. K. Aswal, and S. K. Gupta	221
Effect of post thermal annealing on the structural and optical properties of ZnO thin films prepared from polymer precursor Jijoy P. Mathew, Jacob Mathew, and George Varghese	224
Rutile titania branched nanorods: Room temperature synthesis and characterizations Oh-Shim Joo and Habib M. Pathan	227
Growth and characterization of high quality ZnS thin films by RF sputtering C. Mukherjee, K. Rajiv, P. Gupta, A. K. Sinha, and L. Abhinandan	230
Deposition of non evaporable getter films and their vacuum performance Tripti Bansod, B. K. Sindal, Kvanps Kumar, and S. K. Shukla	233
Synthesis, structural and electrochemical properties of electron beam evaporated V₂O₅ thin films O. M. Hussain and P. Rosaiah	236
Nanomechanical and nanotribological properties of Nb substituted TiN thin films M. Ghanashyam Krishna, K. Vasu, and K. A. Padmanabhan	239
Influence of annealing temperature on electronic and dielectric properties of ZrO₂ thin films on Si S. Uthanna, P. Kondaiah, V. Madhavi, and G. Mohan Rao	242
Substrate temperature effect on structural and optical properties of Bi₂Te₃ thin films B. S. Jariwala, D. V. Shah, and Vipul Kheraj	245
Studies on extraction of zirconium plasma that is produced by electron-impact ionization A. Majumder, B. Jana, G. K. Sahu, S. Baruah, K. B. Thakur, V. K. Mago, and A. K. Das	248

The influence of the CIGS film thickness on its growth and optical properties C. J. Panchal, J. R. Ray, M. S. Desai, and Bharati Rehani	251
Measurement of plasma parameters in zirconium plasma using langmuir probe B. Jana, A. Majumder, S. Baruah, G. K. Sahu, K. B. Thakur, V. K. Mago, and A. K. Das	254
Charge transport of ultrathin CoPc films on LaAlO₃(001) substrate Soumen Samanta, Arvind Kumar, Ajay Singh, A. K. Debnath, D. K. Aswal, and S. K. Gupta	257
Effect of sputtering gas on structural and optical properties of sputtered SiC thin films Ramesh Chandra, Mukesh Kumar, Raghvesh Mishra, Rajesh K. Tiwari, and A. K. Saxena	260
Mechanical properties of single and multilayer CrN films synthesized by pulsed DC sputtering S. K. Pradhan, M. Jeevitha, and Shubhra Bajpai	263
Measurement of neutral atom scattering onto product collector during collimation of atomic beam G. K. Sahu, S. Baruah, S. Lahiri, S. Mahapatra, R. Kalra, B. Jana, R. C. Das, V. Kaushik, R. L. Bharadwaj, A. R. Dixit, A. Majumder, B. Dikshit, K. K. Mishra, M. S. Bhatia, A. V. Bapat, V. K. Mago, D. Das, A. K. Das, K. B. Thakur, and L. M. Gantayet	266
β-ray priming of CVD diamond films - An impedance study K. G. Girija, C. A. Betty, J. Nuwad, S. S. Gandhi, J. Udhayakumar, and C. G. S. Pillai	269
Borondipyrrromethane (BODIPY) as sensitizer for dye sensitized solar cell Vibha Saxena, P. Veerender, S. P. Koiry, A. K. Chauhan, D. K. Aswal, S. Mula, Neelam Shivran, S. Chattopadhyay, and S. K. Gupta	272
Flow velocity measurement of zirconium and copper atomic beams generated using a strip electron gun S. Baruah, G. K. Sahu, R. A. Patankar, and K. B. Thakur	275
Characterization of alkali halides doped 1-(2-methoxy benzyloxy)-8- hydroxy-9,10-anthraquinone films for photovoltaic applications Aman Mahajan, Mandeep Singh, Himani Gupta, R. K. Bedi, S. Kumar, and D. K. Aswal	278
Deposition of manganese sulfide and cadmium doped manganese sulfide thin films by M-CBD Habib M. Pathan, Sampat S. Kale, and Vishal K. Pandit	281
Room temperature oblique deposition of Cd(OH)₂ nanowires Habib M. Pathan and Vishal K. Pandit	284
Charge transport and Kelvin Probe study of organic semiconductor hetero-junction Arvind Kumar, Soumen Samanta, Ajay Singh, A. K. Debnath, R. Prasad, D. K. Aswal, and S. K. Gupta	286

Chemiresistive gas sensing characteristics of cobalt oxide thin films Vishal Balouria, Arvind Kumar, S. Samanta, S. Bhattacharya, A. Singh, A. K. Debnath, Aman Mahajan, R. K. Bedi, D. K. Aswal, and S. K. Gupta	289
Effect of oxygen pressure on optical properties and surface morphology of solid solution based zirconia-magnesia binary composite films S. Jena, R. B. Tokas, N. M. Kamble, S. Thakur, and N. K. Sahoo	292
Studies on structural and optical properties of Cu doped Cd_xZn_{1-x}S thin films by Spray Pyrolysis D. S. Rane and L. A. Patil	295
Characterization of photoresist thin films for surface relief holographic gratings Sanjiva Kumar, A. Biswas, Nisha Prasad, Amrita Debnath, R. B. Tokas, D. V. Udupa, and N. K. Sahoo	298
Design of narrow band notch filter based on guided mode resonance effect in thin film layers Amrita Debnath, Sanjiva Kumar, D. V. Udupa, and N. K. Sahoo	301
Modeling of vapor transport of electron beam evaporation based coating system Namita Maiti, Atul Tak, Yashodhan Khabade, V. B. Suryawanshi, and A. K. Das	304
SnO₂: CuO based hydrogen sulphide sensor on LTCC substrates Manmeet Kaur, S. Kailasa Ganapathi, Varsha Chaware, Vivek Rane, Niranjana Ramgir, Niyanta Datta, Vijaya Giramkar, Girish Phatak, D. K. Aswal, and S. K. Gupta	307
Exciton localization in films of ZnO nanoparticles Manoranjan Ghosh, Karabi Ghosh, G. D. Patra, M. Tyagi, S. Sen, and S. C. Gadkari	310
Epitaxial growth of Eu doped CaF₂ thin film on CaF₂ (111) Manoranjan Ghosh, R. S. Ningthoujam, G. D. Patra, Seema Shinde, S. Sen, S. Bhattacharya, and S. C. Gadkari	313
Compositional analysis of HfO₂: SiO₂ composite thin films and its correlation with refractive index N. M. Kamble, R. B. Tokas, S. Thakur, and N. K. Sahoo	316
Characterization of sputtered samples in Fe-Cu system D. Bhattacharya, T.V. Chandrasekhar Rao, K. G. Bhushan, M. Swain, and S. Basu	319
Author Index	323