

DR. A. M. MAHAJAN



Dr A M Mahajan, Reader

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Dr. Mahajan has completed his **M.Phil** in Electronics from Shivaji University, Kolhapur in 1995 and obtained **Ph.D. degree** in Electronics, from North Maharashtra University, Jalgaon in July-2003. He is having 22 years of teaching (UG/PG) and 14 years of research experience and is currently working as a **Reader** in the department of Electronics, NMU, Jalgaon. He taught the courses like VLSI Design techniques, Principles of CMOS VLSI design, CMOS processing technology, VLSI design methods for ASICs, Device Fabrication techniques, VLSI Design tools (front-end & back-end), Optoelectronics, Mathematical Methods for Electronics (MME), Digital Electronics, Analog circuit design techniques, Digital circuit design and Digital Signal Processing, Automatic process control systems). His native place is a small village PALASARE Tq. Chalisgaon of Jalgaon District. Dr. Mahajan is having hands on experience In designing and commissioning of Thermal CVD, PECVD Machines. In Optimizing the process parameters & Depositing the thin films like SiO₂, SiON and SiN using Thermal CVD & PECVD. Capable of handling the sophisticated characterization equipments like Ellipsometer (Philips SD-1000), FTIR Spectrophotometer (Nicolet-380) and UV VIS Spectrophotometer etc. Gained experience on working with Photolithographic techniques with the working ability in the Clean room environment. Currently, under the guidance of Dr. Mahajan one of the groups (One Ph.D. & 3 Master students) is working on Low k Materials growth and characterization for interlayer applications in VLSI/ULSI technology, including some issues related to Electromigration. Another group (comprising of one M.Phil. & 3 Master students) are working on high k materials (like CeO₂) growth and characterization along with reliability issues through various models like NBTI, PBTI & TDDB issues. In Organic Electronics, synthesis and characterization of conducting polymers for gas sensing & OLED applications is being carried by one group (consisting of one Ph.D., 1 M.Phil. & 2 Master students). One major research project entitled "Characterization of dielectric films deposited by PECVD system" sanctioned by UGC worth Rs. 10.67 lacs has been completed recently. He has guided about 100 master students for their projects on DSP and VLSI Design, development and fabrication of advanced materials. So far 59 research papers have been published /presented by Dr. Mahajan in the National/international journal /Conferences of high repute. He has visited USA, South Korea, Italy, France and Algeria for academic/research purposes. Dr. Mahajan has delivered several invited/popular talks in the conferences/Refresher Courses and at some Engineering colleges. He is a member of Optical Society of India, Instrument Society of India, IEEE EDS He worked on the various committees of the universities Mumbai chapter, DR. Mahajan is the **Member of Senate** of the PG Teachers of North Maharashtra University for the period of 2005-2010. He worked on the various committees of the universities

List of Publications: Dr. A. M. Mahajan

a) Details of Journal Publications (National/International)

- 01) "TEOS-PECVD deposition System for high growth rate deposition of SiO₂ films.", A. M. Mahajan, L. S. Patil, J.P. Bange, and D. K. Gautam, Vacuum,79/3-4 (2005), 194-, 202
- 02) "Influence of process parameters on the properties of PECVD deposited SiO₂ films", A. M. Mahajan, L. S. Patil and D. K. Gautam, Surface and Coatings technology,vol-188/189C(2004) , 314, 318
- 03) "Growth of SiO₂ films using TEOS-PECVD system for microelectronics applications", A M Mahajan, L S Patil, J P Bange & D K Gautam, Surface Coating and Technology, Vol-183/2-3 (2004), 295, 300
- 04) "Growth and Characterization of SiON thin films by using thermal-CVD Machine", R. K. Pandey, L. S. Patil, J. P. Bange, A. M. Mahajan and D.K. Gautam., Journal Optical Materials Vol-25 (1), Feb-2004 , 1, 7
- 05) "Growth and Characterization of SiO₂ films for the fabrication of Optical Wave guides," A. M. Mahajan, L. S. Patil, J.P. Bange, and D. K. Gautam, Journal of Optics, vol.31 (2), 2002, 53 , 58
- 06) "Performance of an active-R Filter in presence of positive feedback", A. B. Kadam and A. M. Mahajan, Journal of Instrument Society of India. 24, No. 1&2, (1994), 35, 41
- 07) "Effect of positive feedback on the response of an Active "R" Filter", A. B. Kadam and A. M. Mahajan, Journal of Instrument Society of India, 25, No. 1&2,(1995), 48, 55
- 08) "Optimization of process parameters for the growth of SiO₂ film using TEOS-PECVD system", A M Mahajan, L S Patil, J P Bange & D K Gautam, Journal of Instrument Society of India., published
- 09)"Growth of SiO₂ films for microelectronics applications: Experimental and analytical study of the process parameters", A. M. Mahajan, J. P. Bange, B. N. Joshi and D.K. Gautam, submitted to African Physical Review through ICMNT-06
- 10) "Synthesis and analysis of low-k material for intermetal dielectric applications in VLSI" Bhavana N. Joshi and A.M. Mahajan, Journal of Optoelectronics and Advanced Materials (in press)
- 11) "Growth and Characterization of Porous SiO₂ Thin Films for Interlayer Dielectrics Applications in ULSI" B. N. Joshi and A. M. Mahajan, Optoelectronics and Advanced Materials-Rapid communications,Vol 1, No.12,(2007) 659-662
- 12) "Analysis of capacitance across interconnects of low-k dielectric used in a deep sub-micron CMOS technology" A. Sonanvane, B. N. Joshi and A.M. Mahajan, Progress In Electromagnetics Research Letters, Vol.1 (2008) 189-196
- 13) "Growth and characterization of MMA incorporated SiO₂ thin films for low-k interconnect dielectrics", Bhavana N. Joshi, M .A. More and A.M. Mahajan, submitted to Semiconductor science and technology.

b) Papers / presented in Conference / published in conference proceedings:

- 14) "Performance of active-R Filter in presence of positive feedback", A.M. Mahajan & A. B. Kadam , Presented in the National Symposium on instrumentation organized at S. V. University, Tirupati during 09/01/94 to 12/01/94., Abstract published in the proceeding as C-67 on page 38
- 15) "Development of TEOS-CVD machine for the growth of SiO₂ films for optoelectronics applications", A M Mahajan, L.S.Patil, J. P. Bange & D K Gautam, Presented in "Research Symposium on Recent Trends in Electronics and information Technology" at North Maharashtra University, Jalgaon on 28/02/2000
- 16) "Development of TEOS-PECVD machine for the growth of SiO₂ films for optoelectronics applications", A M Mahajan, L.S.Patil, J. P. Bange & D K Gautam, Presented in "National symposium on WDM technology " at North Maharashtra University Jalgaon on 22/03/2001
- 17) "Simulation of Process parameters of PECVD machine," A.B. Patil, A. M. Mahajan and D. K. Gautam, Presented in "National workshop/symposium on WDM technology " at North Maharashtra University, Jalgaon on 22/03/2001, First prize of research paper Award winner
- 18) "Growth and Characterization of SiO₂ films for the fabrication of Optical Waveguides", A. M. Mahajan, L. S. Patil, J.P. Bange, and D. K. Gautam, Presented in an international Conference of OPTONICS-2001, held during 27-29 August-2001 at Tiruvananthapuram., Extended abstract published in proceedings on page 8 & 9
- 19) "Design and fabrication of TEOS-PECVD System for high growth rate", A. M. Mahajan, L. S. Patil, J.P. Bange and D. K. Gautam, Presented at National Symposium on Science and Technology of Vacuum and thin films at IISc Bangalore, held during Sept- 5-7,2001, Abstract published in proceedings as pp18
- 20) "Comparative study of SiO₂ film grown by thermal CVD and PECVD" , L. S. Patil, A. M. Mahajan, J.P. Bange, and D. K. Gautam, Presented at National Symposium on Science and Technology of Vacuum and thin films at IISc Bangalore, held during Sept-5-7, 2001 , Extended abstract published in proceedings as pp19
- 21) "Effect of Chamber pressure variation on the R. I. of SiO₂ films deposited by PECVD", A M Mahajan, L S Patil, J P Bange & D K Gautam , Presented in international Conference "BBOFCT-2001" at North Maharashtra University, Jalgaon during 5-7 Dec.2001, Published in Proceeding pp-283-286
- 22) "Effect of channel width on the field spreading in channel Substrate planer blue laser diode", D S Patil, A M Mahajan & D K Gautam, Presented in international Conference "BBOFCT-2001" , Published in Proceeding pp-239-242
- 23) "Study of optical characteristics of Bio membrane for designing and fabrication of Bio sensors for Bio-medical applications", A N Ardad, A M Mahajan, M D Shirsat , Presented in international Conference "BBOFCT-2001" , Published in Proceeding pp-369-373
- 24) "Optimization of process parameters for the growth of SiO₂ film using TEOS-PECVD system", A M Mahajan, L S Patil, J P Bange & D K Gautam, Presented in the national symposium on instrumentation (NSI-27) during Oct-2002, Published in Abstract book on pp-121

- 25) "Effect of O₂/TEOS flow rate ratio on the growth of SiO₂ films using PECVD system", A M Mahajan, L S Patil, J P Bange & D K Gautam, Presented in an international Conference "PHOTONICS-2002" at TIFR, Mumbai, during 16-18, Dec. 2002, Published in Abstract book on pp286
- 26) "Effect of temperature variation on the growth rate of SiO₂ films deposited by PECVD system", A M Mahajan, L S Patil, J P Bange & D K Gautam, Presented in COPE-03, held at NSIT, New Delhi during 6-8th January –2003., Published in Proceeding pp-78-83
- 27) "Analysis of deposition kinetics & apparent activation energy for the growth of SiO₂ films using TEOS-PECVD system", R. S. Dubey, M.P.Bhole, A M Mahajan & D K Gautam, Presented in COPE-03, held at NSIT, New Delhi during 6-8th January –2003., Published in Proceeding pp-146-149
- 28) "Growth of SiO₂ films using Indigenously developed PECVD system for microelectronics applications", A M Mahajan, L S Patil, J P Bange & D K Gautam, Presented in an international conference ICMCTF-2003 held at San Diego, CA, USA during 28th April to 2nd May-2003., Published in Abstract book on pp32-33
- 29) "High Growth rate PECVD system for the deposition of SiO₂ Films", A M Mahajan, L S Patil, J P Bange & D K Gautam, Presented as an invited talk in an international conference ICOT-2004 held at, NMU, Jalgaon during 12th to 14th January-2004., Published in Proceeding pp-78-88
- 30) "Plasma Diagnostic study in a capacitively TEOS- PECVD system", A M Mahajan, Jyotsna Rane & D K Gautam, Presented in an international conference ICOT-2004 , Published in Proceeding pp-503-509
- 31) "Effect of temperature on the deposition kinetics of SiO₂ films grown by PECVD system", A M Mahajan, M.D.Joshi & D K Gautam, Presented in an international conference ICOT-2004 , Published in Proceeding pp-510-515
- 32) "Influence of process parameters on the properties of PECVD deposited SiO₂ films", A M Mahajan, L.S.Patil & D K Gautam, Presented in an international conference ICMCTF-2004 held at San Diego, CA, USA during 19th –23rd April -2004., Published in Abstract book on pp59-60
- 33) "Analytical Study of Plasma parameters using diagnostic techniques in TEOS-PECVD system", Jyotsna Rane, and A. M. Mahajan, Published in book "Microwaves and Optoelectronics" published by Anamaya Publishers, New Delhi (2004), 395-400
- 34) "Dependence of growth rate of SiO₂ Films Deposited by PECVD System on Internal Process parameters", Mohan Joshi, R.S.Dubey and A M Mahajan, Published in book "Microwaves and Optoelectronics" published by Anamaya Publishers, New Delhi , 400-404
- 35) "Mathematical modeling and analysis of Hubbard U for quantum device applications", Sadique Shaikh, A M Mahajan and D K Gautam, NLS-04 held at BARC, Mumbai during Jan-2005, Published in Proceeding pp-326-329
- 36) "Preparation and characterization of Chalkogenide thin films for Photonics applications", Pankaj Verma, Vaishali Salunke, Arjun Ransing and AM Mahajan , SOOP-05 held during Jan-2005 at NPL, New Delhi, Published in Abstract book on pp 153

- 37) "Characterization of Cd_xS_{1-x} thin films grown by CBD technique", Vaishali Salunke Pankaj Verma, Jayesh Mahajan, Sonali Jain and A M Mahajan, International topical conference on optics and Photonics held during Feb-2005, Published in abstract book
- 38) "Effect of reactor geometry on the PECVD deposited SiO_2 films", A M Mahajan & D K Gautam, International conference ICMCTF-2005 held at San Diego, CA, USA during 2nd –6th May-2005., Published in abstract book
- 39) "Preparation and characterization of Cd_xS_{1-x} thin films grown by CBD for absorbers in solar cells", Bhavana N.Joshi, Savita Firke & A M Mahajan, Presented in NASMAT-2006 held at Shivaji University, Kolhapur during 23rd -26th Jan-2006, Published in abstract book on pp-114
- 40) "Chalcogenide thin films for photonics applications", Bhavana N. Joshi & A M Mahajan, Presented in NASMAT-2006 held at Shivaji University, Kolhapur during 23rd -26th Jan-2006, Published in proceedings on pp-09-11
- 41) "Voice controlled electrical equipment with real time DSP", Himali Attarde, Milind Bharambe, Vikram Khachane & A M Mahajan, Presented in NSIAE-2006 held at A,S&C College, Chopda During 28th -29th Jan-2006 , Published in Souvenir on pp-75,CP45
- 42) "High performance encoder with priority lookahead using VHDL tools for appliances control", Prajakta Kulkarni, Rehan Ahmed, Mukesh Patil & A M Mahajan, Presented in NSIAE-2006 held at A,S&C College, Chopda During 28th -29th Jan-2006, Published in Souvenir on pp-98,PP11
- 43) "A controller IC for bottling system", Sachin Chandra & A M Mahajan, Presented in NSIAE-2006 held at A,S&C College, Chopda During 28th -29th Jan-2006, Published in Souvenir on pp-70,CP35
- 44) "Correlator IC for detection of signal in noise", Soumitra Chandra & A M Mahajan, Presented in NSIAE-2006 held at A,S&C College, Chopda During 28th -29th Jan-2006, Published in Souvenir on pp-99,PP12
- 45) "Growth of Zn_xS_{1-x} thin films as buffer layer in solar cell", Bhavana N.Joshi, Narendra L.Jaware, Savita Firke & A M Mahajan, Presented in NSIAE- held at A,S&C College, Chopda During 28th -29th Jan-2006, Published in Souvenir on pp-101,pp16
- 46) "Growth of $SiCOH$ thin films by PECVD for interlayer applications", Priti Borole, Bhavana N. Joshi & A M Mahajan, Presented in NSIAE-2006 held at A,S&C College, Chopda During 28th -29th Jan-2006, Published in Souvenir on pp-71,CP36
- 47) "PECVD grown ZrO_2 thin films for optical integrated circuits", Manisha Deshpande, Bhavana N. Joshi & A M Mahajan, Presented in NSIAE-2006 held at A,S&C College, Chopda During 28th -29th Jan-2006, Published in Souvenir on pp-101,PP17
- 48) "Effect of chamber pressure on the properties of PECVD grown SiO_2 thin films", Bhavana N. Joshi & A.M. Mahajan, Presented in Raman Memorial Seminar-2006 held at North Maharashtra University, Jalgaon on 28th Feb 2006, Abstract Published in abstract book on P. No. 09
- 49) "Growth of SiO_2 films for microelectronics applications: Experimental and analytical study of the process parameters", A. M. Mahajan, J. P. Bange, B. N. Joshi and D.K. Gautam, Presented in ICMNT-06, during 19-23rd Nov-2006, Published in Souvenir of ICMNT06 on pp 124 & 125

- 50) "Study of SiO₂ xerogel thin films deposited by spin coating as interlayer dielectrics in VLSI" Bhavana N. Joshi & A. M. Mahajan, Presented in Raman Memorial Seminar-2007 held at North Maharashtra University, Jalgaon on 28th Feb 2007, Abstract Published in abstract book on P.No.12
- 51) "Study of Optical Properties of SiO₂ Xerogel Films Deposited by Spin Coating", Bhavana N. Joshi, Shewta Mahajan, Yogesh Mhaisagar & A. M. Mahajan, Presented in Optical society of India symposium on Contemporary optics & applications held at M S University of Baroda, Vadodra during 1-3rd March 2007, Abstract published in proceedings of OSI-XXXII on PP 96-97
- 52) "Improved interconnect parameters: A novel 0.05µm CMOS technology for future ULSI", Avinash Sonawane, Bhavana N. Joshi & A. M. Mahajan published in the abstract book of National Seminar on The role of material science in electronic industry & information technology – A future Perspective organized by Dyanprassarak Mandal's College of arts, science, commerce ,management studies & Technology, Assagao,Bardez Goa during 9th -10th March 2007.
- 53) "Porous SiO₂ thin films for ULSI applications", Bhavana N. Joshi & A.M. Mahajan, Presented in XIV International workshop on the Physics of Semiconductor Devices IWPSD 2007 held at IIT, Mumbai during 2-6 Dec. 2007 Published in Proceedings on pp 261-263
- 54) "Electronic Nose: Thin film conducting Polymer Polyaniline for Toxic Gas Sensor" Abhay G. Shrivias, R. G. Bavane & A.M. Mahajan, Presented in XIV International workshop on the Physics of Semiconductor Devices IWPSD 2007 held at IIT, Mumbai during 2-6 Dec. 2007 Published in Proceedings on pp 621-623
- 55) "MMA incorporated SiO₂ low dielectric thin films", Swati Rane, Purnima Kulkarni, Bhavana N. Joshi, & A.M. Mahajan, Presented in International Conference on Advanced Materials and Applications ICAMA-2007 held at Shivaji University, Kolhapur during 15th -17th Nov. 2007 Published in Abstract book onpp29
- 56) "FTIR Study of MMA incorporated SiO₂ thin films", Bhavana N. Joshi, & A.M. Mahajan, Presented in International Conference on Advanced Materials and Applications ICAMA-2007 held at Shivaji University, Kolhapur during 15th -17th Nov. 2007 Published in Abstract book on pp 322
- 57) "Surface modification study of SiO₂ xerogel thin film", Purnima Kulkarni, Swati Rane, Bhavana N. Joshi, & A.M. Mahajan, Presented in International Conference on Advanced Materials and Applications ICAMA-2007 held at Shivaji University, Kolhapur during 15th -17th Nov. 2007 Published in Abstract book on pp 321
- 58) "Influence of interconnect dimensions on electromigration for Cu/Low-k interconnect structure: An analytical study", Bhavana N. Joshi and A.M. Mahajan, Accepted for IPFA which will be held in Singapore during 7th -9th July 2008
- 59) "Synthesis and characterization of hybrid thin films for nanoelectronics technology", B.N. Joshi, A.M. Mahajan, Accepted for The 4th international conference on technological advances of thin films and surface coatings which will be held in Singapore during 13th -16th July 2008

★ **Books Edited/Published: 02**

(International conference Proceedings co-edited)

- 01) Proceedings of an International conference BBOFCT-2001 held at, NMU, Jalgaon during 5th –7th December-2001, Co edited by A.M. Mahajan
- 02) Proceedings for an International conference ICOT-2004 held at, NMU, Jalgaon during 12th to 14th January-2004, Co edited by A.M. Mahajan