



Dr. Arijit Roy

Assistant Professor & HOD

Department of Electronics
West Bengal State University
Barasat, 24-Parganas (North)
Malikapur, Kolkata
India 700 126

Dr. Arijit Roy is the first ‘Head of the Department’ of the department of Electronics at West Bengal State University. Dr. Roy has attended many prestigious institutes like IITs and NTU (Singapore) in his career. Apart from his involvement with academic institutes, he has gained industry experience during his employment at Infineon Technologies. He has served consultancy to other MNCs too.

Dr. Roy has published many research articles in international journal/conference of repute. Among his publications, a 75-journal-page-size review article titled “Electromigration in ULSI interconnects” in a journal of impact factor 17.731. This pioneer review article is believed to be the longest documented work in the history of topic. He has authored a research monograph titled “Electromigration in Cu Interconnects: The Driving Force Formalism”, Lambert Academic Publishing, Germany (ISBN: 978-3-8454-1292-4), published in 2011.

Dr. Roy is also involved as reviewer, editorial member for few international publishers. So far his research works have been cited 102 times (excluding self citation). Presently his research h-index is 5. Dr. Roy's biography is listed in "Who's Who in Science and Engineering" and in "Who's Who in World".

Research Interest: Quantum Computation
 Microelectronic Reliability
 Nanoelectronics
 Optical fiber

Date: Jan’2012.

Visit Updated Webpage at: <http://www.wbsubregistration.academia.edu/DrArijitRoy>

A. Education

- Ph. D. (School of EEE, NTU, Singapore)
- M. Tech. (Instrument Tech., Indian Institute of Technology—Delhi, India)
- M. Sc. (Physics, Indian Institute of Technology—Kharagpur, India)
- B. Sc. (Physics Hons, University of North Bengal, India)

B. Main Activities

- Teaching : Courses related to “M.Sc. in Electronics”

For Lecture Notes, Assignments etc. students are requested to visit my webpage:

<http://www.wbsubregistration.academia.edu/DrArijitRoy>

- **Research** : My research group presently consists of myself and my three PhD students. The group is working in the area of: Nanoelectronics, Quantum Computation.
- **Administrative** : (a) HOD, Department of Electronics, WBSU
(b) Vice-chairman, PG-Electronics – BOS, WBSU
(c) Vice-chairman, UG-Electronics – BOS, WBSU
(d) Member, UG-Web&Multimedia Hons. – BOS, WBSU
(e) Member, PG-Admission Committee, WBSU
(f) Member, NSS, WBSU
(g) In-charge of Training & Placement Cell, WBSU
(h) University Subject Expert for recruitment of part-time teachers in affiliated colleges

C. Projects

- Projects from Govt. Org. : Completed: Nil, Ongoing: Nil
- Projects (industrial) : Completed: 16 (Total Rupees: 1.32 Crores), Ongoing: Nil

D. Synergetic Activities

- Reviewer for few international journals
- Member of Advisory Board – IEEE ICCIA-2011
- Member of Editorial Board – Microelectronics and Solid State Electronics (journal)
- Member of Scientific and Technical Committee & Editorial Review Board on Engineering and Applied Science – World Academy of Science, Engineering and Technology (lifetime)

E. Supervisory Activities

- List of PhD thesis: Completed: 0, In-progress: 3
- PhD students: 1. Debyendu Chatterjee (Quantum Computation)
2. Subhasis Pal (Quantum Algorithm)
3. Rupam Mukherjee (Single Electron Transistor)
- List of Master thesis: Completed: 1, In-progress: 4
- Industrial Attachments (IA) Projects (B.E. student): Completed: 2, In-progress: 0
1. Characterization of pop-corn effect in ICs using strain gage at Infineon Technologies Asia Pte Ltd, Singapore, 2008, NTU-Student: Myint Myint
2. Implementation of in-situ monitoring system for reliability chambers at Infineon Technologies Asia Pte Ltd, Singapore, 2008, NTU-Student: Ying Hao

F. Distinguishable Achievements

- Published a **Review Article** (of size 75-Journal-Page & it is the longest documented work in the history of the topic) in a journal of impact factor 17.731

- Invited to write a monograph on “Electromigration” from WSPC & LAP
- Obtained 2nd Best paper award in Symposium On Microelectronics—2004
- Qualified GATE’99 (Physics) with 97.92 percentile (All India Rank = 31)
- Listed in “Who’s Who in Science & Engineering” and “Who’s Who in World”

G. Employment History

- Assistant Professor : [2 Apr 2009 to present], Dept. of Electronics, West Bengal State University, India
- Reliability Engineer : 1-Y & 9-M [17 Jul 2007 to 31 Mar 2009], Infineon Technologies Asia Pte Ltd, Singapore
- Research Associate : 2-Year [7 Sep 2005 to 16 Jul 2007], School of EEE, NTU, Singapore

H. Publication

- **Book**

- Title: Electromigration in Cu Interconnects – The Driving Force Formalism: Modeling and Experiment

Author: Dr. Arijit Roy

Publisher: Lambert Academic Publishing, Germany (printed in UK and USA), 2011

ISBN: 978-3-8454-1292-4

- **Research Papers** (Citation: Excludes self citation, Impact Factor: At time of publication)

Best three papers:

- Very high current density package level electromigration test for copper interconnects, **Arijit Roy**, Cher Ming Tan, Journal of Applied Physics, Vol. 103, pp. 093707 (1-7), 2008, **Impact Factor 2.316**.
- **Review Article:** Electromigration in ULSI interconnects, Cher Ming Tan, **Arijit Roy**, Materials Science and Engineering: R: Reports, Vol. 58, Issues 1-2, pp. 1-75, 2007, **Impact Factor 17.731**.
- Electromigration in damascene copper interconnects of line width down to 100 nm, **Arijit Roy**, R. Kumar, C. M. Tan, T. K. S. Wong, C.-H. Tung, Semiconductor Science and Technology, Vol. 21, pp. 1369-1372, 2006, Impact Factor 1.222.

All papers:

1. Comment on “Quantum Multiplexer Designing and Optimization applying Genetic Algorithm”, Subhasis Pal, **Arijit Roy**, Dibyendu Chatterjee, Vol. 9, Issue 1, 2012, *Impact Factor: 0.242*, ISSN No. **1694-0814**, Cited 0 times.
2. Electromigration in width transition copper interconnect, Arijit Roy, Yuejin Hou, Cher Ming Tan, Microelectronics Reliability, Vol. 49, pp. 1086-1089, 2009, *Impact Factor 1.290*, ISSN No. **0026-2614**, Cited: 0 times.
3. Very high current density package level electromigration test for copper interconnects, **Arijit Roy**, Cher Ming Tan, Journal of Applied Physics, Vol. 103, pp. 093707(1-7), 2008, *Impact Factor 2.316*, ISSN No. **0021-8979**, Cited: 1 times.
4. Application of gamma distribution in electromigration for submicron interconnects, Cher Ming Tan, Nagarajan Raghavan, **Arijit Roy**, Journal of Applied Physics, Vol. 102, pp. 103703(1-9), 2007, *Impact Factor 2.316*, ISSN No. **0021-8979**, Cited: 5 times.
5. **Review Article:** Electromigration in ULSI interconnects, Cher Ming Tan, **Arijit Roy**, Materials Science and Engineering: R: Reports, Vol. 58, Issues 1-2, pp. 1-75, 2007, *Impact Factor 17.731*, ISSN No. **0927-796X**, Cited: 29 times.
6. Probing into the asymmetric nature of electromigration performance of submicron interconnect via structure, **Arijit Roy**, C. M. Tan, Thin Solid Films, Vol. 515, pp. 3867-3874, 2007, *Impact factor 1.666*, ISSN No. **0040-6090**, Cited: 5 times.
7. Room temperature observation of point defect on gold surface using thermovoltage mapping, **Arijit Roy**, C. M. Tan, S. J. O’shea, K. Hippalgaokar, W. Hofbauer, Microelectronics Reliability, Vol. 47, pp. 1580-1584, 2007, *Impact Factor 0.815*, ISSN No. **0026-2614**, Cited: 0 times.
8. Electromigration in damascene copper interconnects of line width down to 100 nm, **Arijit Roy**, R. Kumar, C. M. Tan, T. K. S. Wong, C.-H. Tung, Semiconductor Science and Technology, Vol. 21, pp. 1369-1372, 2006, *Impact Factor 1.222*, ISSN No. **1361-6641**, Cited: 7 times.
9. Experimental investigation of the impact of stress free temperature on the electromigration performance of copper dual damascene submicron interconnect, **Arijit Roy**, C. M. Tan, Microelectronics Reliability, Vol. 46, pp. 1652-1656, 2006, *Impact Factor 0.742*, ISSN No. **026-2614**, Cited: 3 times.

10. Investigation of the effect of temperature and stress gradients on accelerated EM test for Cu narrow interconnects, C. M. Tan, **Arijit Roy**, Thin Solid Films, Vol. 504, pp. 288-293, 2006, *Impact Factor 1.569*, ISSN No. 0040-6090, Cited: 22 times.
11. Effect of test condition and stress free temperature on the electromigration failure of Cu dual damascene submicron line-via test structure, **Arijit Roy**, C. M. Tan, R. Kumar, X. T. Chen, Microelectronics Reliability, Vol. 45, pp. 1443-1448, 2005, *Impact Factor 0.607*, ISSN No. 0026-2614, Cited: 3 times.
12. Current crowding effect on copper dual damascene via bottom failure for ULSI Applications, C. M. Tan, **Arijit Roy**, A. V. Vairagar, A. Krishnamoorthy, S. G. Mhaisalkar, IEEE Transactions on Device and Materials Reliability, Vol. 5, No. 2, pp. 198-205, 2005, *Impact Factor 1.044*, ISSN No. 1530-4388, Cited: 21 times.
13. Effect of vacuum break after the barrier layer deposition on the electromigration performance of aluminum based line interconnects, C. M. Tan, **Arijit Roy**, K. T. Tan, D. S. K. Ye, F. Low, Microelectronics Reliability, Vol. 45, pp. 1449-1454, 2005, *Impact Factor 0.607*, ISSN No. 0026-2614, Cited: 0 times.
14. Optimal design of broadband long period grating-based LP₀₁↔LP₀₂ mode converters for dispersion compensation, **Arijit Roy**, P. Sharan, H. N. Acharya, Journal of Optical and Quantum Electronics, Vol. 35, Issue 6, pp. 561, 2003, *Impact Factor 0.732*, ISSN No. 0306-9819, Cited: 2 times.

Leading conference papers:

15. Dynamics of Electromigration Induced Void in Submicron Cu Interconnects, **Arijit Roy**, IEEE ICCIA-2011, ISBN No. 978-1-4577-1961-5, 2011, Cited 0 Times
16. Stress migration reliability of wide Cu interconnects with gouging vias, Y. K. Lim, **R. Arijit**, K. L. Pey, C. M. Tan, C. S. Seet, T. J. Lee and Vigar, IEEE IRPS, pp. 203-208, 2005, ISSN No: 1541-7026, Cited: 4 times.
17. Extrapolation of electromigration accelerated test data for submicron interconnect via structure, **Arijit Roy**, C. M. Tan, Presented in ICMAT-2005, ISBN No. 981-05-3562-7, Cited 0 times.
18. Effect of current crowding on copper dual damascene via bottom failure for ULSI applications, **R. Arijit**, C. M. Tan, V. V. Anand, K. Ahila, G. Zhang, M. G. Subodh, IEEE IPFA, pp. 173-176, 2004, ISSN No. 1946-1542, Cited: 0 times.

19. High bandwidth long period grating based LP mode converter in few mode fibers for dispersion compensation, Arijit Roy, Preeta Sharan, H. N. Acharya, Sixth International Conference on Optoelectronics, Fiber Optics and Photonics (technical co-sponsored by IEEE), Bombay, 2002.

I. Invited Lecturers (prestigious only)

1. Current Crowding Effect in Electromigration Failure of Chip-level Cu Dual Damascene Interconnects – Presented in Symposium On Microelectronics, Singapore, 2004. [Won the 2nd Best Paper].
2. Recent Developments in IC Manufacturing Technologies – Presented as Plenary Lecture in 1st IEEE International Conference on Communication and Industrial Application, Dec 26-28, 2011, **ISBN No. 978-1-4577-1961-5.**

I. Impact Analysis on My Research

- Total number of paper published = 19 (14 in international journals & 5 in international conferences)
- \sum (Impact factor)_{journal only} = 32.839
- Publishing year of first and last journal paper = 2003 & 2011
- Total citation (excluding self citation) = 102
- h-index = 5
- List of cited works (see the table given below)

My Published Paper No	Citation Analysis Table	
	Cited Papers	No. of Citation
3	1. Y. Hou et al., IEEE 12 th ISIC, 522-525, 2009.	1
4	1. V. M. Dwyer, J. Appl. Phys. 104, 053708, 2008. 2. N. Raghavan et al., IEEE IPFA, 2008. 3. V. M. Dwyer, J. Appl. Phys. 102(10), 103703, 2010. 4. R. G. Filippi, J. Appl. Phys. 107 (10), 103709, 2010. 5. C.-H. Chang et al., Computational Statistics 26(1),55-76, 2011.	5
5	1. N. Raghavan et al., IEEE IPFA, 257-262, 2007. 2. C. M. Tan et al., Semicond. Sci. Technol. 22(8), 941-946, 2007. 3. C. T. Sah et al., Chinese J. Semiconductors 29 (5), 815-821, 2008. 4. N. Raghavan et al., IEEE IPFA, 2008. 5. Y. Wang et al., Microelectronics Reliability 48, 1800-1803, 2008. 6. G. J. Liu et al., Corrosion Science 51 (3), 463-468, 2009.	28

	<ol style="list-style-type: none"> 7. J. Sarkar et al., J. of Alloys & Compounds. 479(1-2), 719-725, 2009. 8. C. M. Tan et al., EuroSimE 2009, art. no. 4938513. 9. L. Wu et al., J. Electrochem. Soci. 156 (9), H734-H739, 2009. 10. T. Kizuka et al., Appl. Phys. Express 2(7), art. no. 075003, 2009. 11. L. Nicholls et. al., IEEE EPTC, 914, 2009. 12. J. Jaeschke et al., IEEE EPTC, 395-400, 2009. 13. S. Strehle et al., Microelectronics Engineering 86 (12), 2396, 2009. 14. Z. H. Cao et al., J. Appl. Phys. 106 (11), 113513, 2009. 15. F. He et al., Microelectronics Reliability 50 (3), 376, 2010. 16. P. Dandu et al., Microelectronics Reliability 50 (4), 547, 2010. 17. S.-H. Kim et al., Materials Transactions 51(4), 659-663, 2010. 18. Z.-C. Liu et al., J. Nanoscience & Nanotechnology 10(4), 3072, 2010. 19. Z.-H. Cao et al., Phy. Rev. B 81(11), 113405, 2010. 20. Y. X. Zhang et al., IEEE Proc. ECTC, 617-624, 2010. 21. A. I. Oliva et al., Materials Characterization 61 (7), 696-702, 2010. 22. S. Vaucher et al., IEEE Int. Microwave Symp. Digest, 1440, 2010. 23. K. Khoo et al., Materials Transactions 51 (7), 1183-1187, 2010. 24. M. Rozkovec et al., Proc. 13th Euromicro Conf. Digital System Design : Architech., Methods and Tools, ESD, 525-530, 2010. 25. J. Jaeschke et al., ESTC, art. no. 5642976, 2010. 26. H. Ceric et al., Mat. Sci. & Engg. R : Reports 71(5-6), 53-86, 2011. 27. A. Wahab et al., Advanced Materials Research 146-147, 1937, 2011. 28. H. Ceric et al., IEEE IPFA 2011, 5992749. 29. H. Wojcik et al., IEEE SCD, 6068735, 2011. 	
6	<ol style="list-style-type: none"> 1. J.-G. Ma et al., J. Univer. Elec. Sci. & Tech. of China, 38 (5), 495, 2009. 2. F. He et al., Microelectronics Reliability 50 (3), 376, 2010. 3. K. Croes et al., IEEE IRPS, 591-598, 2010. 4. K. Croes et al., Microelectronics Engineering 88(5), 614, 2011. 5. K. S. McGarrity et al., Computational Mat. Sci. 50(10), 3043, 2011. 	5
8	<ol style="list-style-type: none"> 1. Rani S. Ghaida et al., IEEE DFT in VLSI Systems, 59-67, 2007. 2. Y.-L. Shen, Prog. Mat. Sci. 53(5), 838-891, 2008. 3. Y.-L. Shen, IEEE Trans. Dev. & Mat. Reliability 8, 600-607, 2008. 4. R. S. Ghaida et al., Journal of Electronic Testing: Theory and Applications 25, 67-77, 2009. 5. Q. Huang et al., Nanotechnology 20 (7), 075706, 2009. 6. J.-G. Ma et al., J. Univer. Elec. Sci. & Tech. of China, 38 (5), 495, 2009. 7. F. He et al., Microelectronics Reliability 50 (3), 376, 2010. 	7
9	<ol style="list-style-type: none"> 1. W. Li et al., J. Appl. Phys 105 (1), 014305, 2009. 2. F. He et al., Microelectronics Reliability 50 (3), 376, 2010. 3. X.-D. Wang et al., Journal of Beijing University of Technology 36(1), 81-86, 2010. 	3
10	<ol style="list-style-type: none"> 1. W. Li et al., J. Appl. Phys. 101(10), 104314, 2007. 2. Y. F. Zhu et al., J. Electrochem. Society 154(3), C153-C158, 2007. 3. W. Tang et al., J. Functional Materials 37(suppl.), 808-810, 2006. 4. C. M. Tan et al., J. Appl. Phys. 102, 033705, 2007. 5. W. Tazibt et al., Microelectron. Reliab. 48, 348-353, 2008. 6. W. Tang et al., Rare Metal Materials & Engg., 37(4), 617-620, 2008. 7. T. O. Ogurtani et al., J. Appl. Phys., 104(2), 023521, 2008. 8. Chen et al., IEEE ICEPT-HDP, 1-7, 2008. 9. Y. Hou et al., IEEE INEC, 610-613, 2008. 10. S. Strehle et al., Microelectronics Engineering 86 (12), 2396, 2009. 11. J.-G. Ma et al., J. Univer. Elec. Sci. & Tech. of China, 38 (5), 495, 2009. 12. F. He et al., Microelectronics Reliability 50 (3), 376, 2010. 	22

	<p>13. L. Liang et al., Gutu Lixue Xuebao/ Acta Mechanica Solida Sinica 31 (2), 164-172, 2010.</p> <p>14. P. Dandu et al., IEEE Proc. ECTC, 396-402, 2010.</p> <p>15. J. Jing et al., ASME Trans. J. Electronic Packaging 132(1), 0110021-0110027, 2010.</p> <p>16. K. Croes et al., Microelectronic Engineering 88(5), 614, 2011.</p> <p>17. M. Li et al., Journal of Physics D: Appl. Phys. 44(11), 115501, 2011.</p> <p>18. Y. Zhang et al., Acta Mechanica Solida Sinica 32 (2), 158, 2011.</p> <p>19. J. Hao et al., Proc. Eelec. Comp. & Technol. Conf., 1933, 2011.</p> <p>20. Y. F. Zhu et al., J. Appl. Phys. 110(2), 023525, 2011.</p> <p>21. I. Bauer et al., Microelectronics Reliability 51(9-11), 1587, 2011.</p> <p>22. L. Liang et al., J. Electronic Packaging Trans. ASME 133(3) 031002, 2011.</p>	
11	<p>1. W. Li et al., J. Appl. Phys. 101(10), 104314, 2007.</p> <p>2. H. Shigeyama et al., Jpn. J. Appl. Phys. 50, 05EA05, 2011.</p> <p>3. G. Yuan et al., Journal of Semiconductors 32 (5), 055011, 2011.</p>	3
12	<p>1. Y. L. Hsu et al., J. Electrochem. Society 153(8), G782-786, 2006.</p> <p>2. C.-H. Lin et al., IEEE EPTC, 849-852, 2006.</p> <p>3. C. M. Tan et al., Semicond. Sci. Technol. 22(8), 941-946, 2007.</p> <p>4. Y. Hou et al., IEEE IPFA, 65-69, 2007.</p> <p>5. C. M. Tan et al., J. Appl. Phys. 102, 033705, 2007.</p> <p>6. W. Li et al., Microelectron. Reliab. 47, 1497-1501, 2007.</p> <p>7. N. Raghavan et al., IEEE IPFA, 257-262, 2007.</p> <p>8. Z. Wu et al., Microelectron. Reliab., 48, 578-583, 2008.</p> <p>9. Y. Hou et al., Semicond. Sci. Technol., 23(7), 075023, 2008.</p> <p>10. T. O. Ogurtani et al., J. Appl. Phys. 104(2), 023521, 2008.</p> <p>11. N. Raghavan et al., IEEE IPFA, 2008.</p> <p>12. M. Lin et al., IEEE IRW, 32-35, 2008.</p> <p>13. Y. Hayashi et al., IEEE Trans. Electron Devices 58 (8), 1579, 2009.</p> <p>14. J.-G. Ma et al., J. Univer. Elec. Sci. & Tech. of China, 38 (5), 495, 2009.</p> <p>15. M. Lin et al., IEEE IPFA, 603-607, 2009.</p> <p>16. M. Lin et al., Japanese Jap 48 (4 Part 2), art no. 04C027, 2009.</p> <p>17. F. He et al., Microelectronics Reliability 50 (3), 376, 2010.</p> <p>18. C.-C. Lee et al., IEEE Trans. Advanced Packaging 33(1), 189, 2010.</p> <p>19. A. Rajaram et al., IEEE Trans. Computer-Aided Des. Inte. Cir. Sys. (12), 1945, 2010.</p> <p>20. M. C. Strus et al., Nanotechnology 22(26), 265713, 2011.</p> <p>21. S.-F. Ding et al., J. Electrochem. Soc. 158 (12), H1228, 2011.</p>	21
14	<p>1. J. Kanka, Pro. SPIE-The Int. Soci. for Optical Engg, 7714, 2009.</p> <p>2. J. Kanka, Pro. SPIE-The Int. Soci. for Optical Engg, 8073, 2011.</p>	2
16	<p>1. Y. K. Lim et al., IEEE Technical Digest, IEDM 2005.</p> <p>2. Y. K. Lim et al., IEEE IRPS 2007.</p> <p>3. Z. Wu et al., Microelectron. Reliab., 48, 578-583, 2008.</p> <p>4. J. Ciptokusumo et al., Microelectron. Reliab., 49 (9-11), 1090, 2009.</p>	4
Total number of citation		102

Contact Address:

Dr. Arijit Roy
Dept. of Electronics
West Bengal State University
Malikapur, Kolkata, India 700126.
Phone: +91-9051503636
Fax: +91-3324251977
e-mail: arijitroy@live.com