VIKRAM L. DALAL-Resume

1. Personal:

ISU-Original date of employment:	August 21,1988
Citizenship	U.S.
Address(Home):	928 Vermont Circle Ames, Iowa 50014
Address(Work)	2126 Coover and 135 ASC1 Iowa State University Ames, Iowa 50011 Tel 515 294 1077
email:	vdalal@iastate.edu

2. Education

M.P.A.(Economics)	Princeton University	1975
Ph.D. (EE)	Princeton University	1969
B.E.(EE.)	U. of Bombay, India	1964

Awards and Honors:

Anson Marston Distinguished Professor (2014)
Fellow, IEEE (2008)
Fellow, APS (2010)
Fellow, AAAS (2011)
IBM Faculty fellowship (2011-13)
Micron Faculty Fellowship for Excellence (2002-current)
IEEE-EDS Distinguished Lecturer (2004-current)
Distinguished Visiting Professor, IIT-Bombay, India (2010-current)
Distinguished Visiting Professor, Cochin University of Science and Technology, India (2011)
Thomas Whitney Chair in ECpE (2002-)
David Boylan Outstanding Faculty Research Award, ISU-College of Engineering (2005)
Warren Boast Undergraduate Excellent Teaching Award, Iowa State University (2002)
Arthur LeGrand Doty Fellowship, Princeton University (1964-66)
Gold Medalist, University of Bombay (1962, 63)
Rotary Fellowship (1964)

3. Academic Experience

9/2014-present	Anson Marston Distinguished Professor of Engineering
8/1988 - present	Professor, Electrical and Computer Engr, Iowa State University, Ames, Iowa
4/1999 – present	Director, Microelectronics Research Center Iowa State University, Ames, Iowa
7/2006- 9/2010	Assoc. Chair, ECpE Department Iowa State University
1976-1981	Manager, device group University of Delaware, Institute of Energy Conversion, Newark, DE 19711

4. Summer Employment

1986 Summer	Visiting scientist Institute of Energy Conversion, University of Delaware

5. Other academic experience

2010-current	IIT-Bombay, India Distinguished Visiting Professor
2007 (January)	IIT-Bombay, India Visiting Professor Offering graduate seminars, and helping set up joint research programs between IIT and Iowa State
2005 (Summer)	Cambridge University, Cambridge, UK Visiting professor
2005 (January)	Tata Institute of Fundamental Research, (A post-graduate University) Bombay, India Visiting Professor
2002 Summer (June)	Eindhoven Institute of Technology, Eindhoven, Netherlands, Visiting scientist

1975 Summer	Princeton University Research Associate
1/1976 - 3/1976	Princeton University and Ford Foundation Research Associate

6. Industrial Experience

1986-88	Polaroid Corp, Walthan, MA Technical manager and PI
1983-86	Spire Corp, Bedford, MA Technical Manager and PI
1981-83	Chronar Corp Vice President, R&D
1969-74	RCA Labs, Princeton, NJ Research Scientist
1967 Summer	Bell Laboratories, Murray Hill, NJ Research Scientist

7. International Collaboration:

1. IIT-Bombay (India) Research on solar cells
2. IISc-Bangalore (India) Research on Organic Solar cells
3. Nazarbayev University, Kazakhstan, Research on organic solar cells.

8. Graduate students graduated

1. M.S. (Thesis)
N. Kandalaft
S. Goenewan
S. Chopra
G. Baldwin – Now at TI
S. Kaushal – Now at Tokyo-Electron America
P. Chahal –got Ph.D. at Georgia tech-now at Michigan State faculty
T. Maxson – Now at First Solar
R. Estwick – Now with U.S. Navy
J. Herrold – Now at Intel
B. Oliver –Now at Seagate
S. Haroon –Now at Motorola
K. Erickson – Now at IBM
V. Vu – Now with Lockheed
M. DeFreese – Now At Motorola
C. Bezbaruah
R. Keen – Now At Motorola
M. Petersen – Now at Maxim Semiconductors
P. Seberger - now at Micron technology
M. Pontoh - now at Micron technology
Y. Hu – now faculty at South Dakota State
J. Graves
P. Sharma –Now at Micron
J. Koch
J. McDonald – at Cypress
J. Booher
D. Pates – Now at Micron (2007)
Cole Petersberg – (Now at Georgia Tech (Ph.D)) (2007)
Phil Reusswig – (Now at MIT -Ph.D student) (2008)
Michael Beckman – Now at TI (2008)
Michael McWhirter (2009)
Jason Jirak (Now at Intel) (2009)
Ryan Boesch (Now a Ph.D. student at Stanford) (2009)
Benjamin Curtin (Ph.D. student at UCSB) (2009)
Brian Lewis (Now a Ph.D. student at UCSD) (2010)
Dan Congreve (Ph.D. student at MIT-graduated 2015; now post-doc at MIT) (2011)
Brian Modtland (Now a Ph.D. student at MIT) (2013)
Watson Mulder (2016)

2. M.S. -Non-thesis

H. Sathwane
X. Huang
R. W. Mayer (2010)
R. Gebhardt (2013)
J. Henspeter (2016)
H. Gaonkar (2017)
Nistha Bhatnagar (2018)

3. Ph.D.

F. Alvarez (1980)	Now at U. Campinas, Brazil
B. Moradi (1993)	Now at Micron Technology
S. DeBoer (1995)	Now at Micron Technology
G. Baldwin (1994)	Now at Texas Instruments
E. X. Ping (1995)	Now at Applied Materials
S. Kaushal (1997)	Now at Tokyo Electron-America
J. Herrold (2000)	Now at Intel
Z. Zhou (2001)	Not known
Y. Liu (2002)	Now at Texas Instruments
A.Sanford (2003)	Now at Dallas Semiconductors
J. Zhu (2003)	Now at SanDisk
M. Ring (2004)	Now at Fairchild
Xuejun Niu (2004)	Now at Intel
Puneet Sharma (2005)	Now at Micron technology
Nanlin Wang (2006)	Now at Global Foundry,NY
B. Choudhary (2005)	Now at Intel
Durga Panda (2006)	Now at Micron Technology
K. Muthukrishnan (2007)	Now at Micron technology
V. Jaju (2008)	Now at Form Factor, Livermore, CA
D. Ghosh (2008)	Now at Apple
Satya Saripalli (2008)	Now at Maxxim
Atul Madhavan (2009)	Now at Intel
Nayan Chakravarty(2011)	Now at Micron Technology
Ashutosh Shyam (2011)	Now at Intel
Sambit Pattnaik (2012)	Now at Global Foundry, NY
Zhao Li (2013)	Now at Lam Research
Shantan Kajjam (2013)	Now at Intel
Joydeep Bhattacharya (2013)-co Major: R. Biswas	Now at Intel
Siva Konduri (2014)	Now at Intel
Mehran Samiee (2015)	Now at Micron
Pranav Joshi (2016)	Now at Intel
Hisham Abbas (2017)	Now at Micron
Tanvir Muntasir (2017)co Major with S. Chaudhary	Now at Intel

Liang Zhang (2017)	Now at Applied Materials
Istiaque Hossain (2018)	Now at Micron Technology
Satvik Shah (2018)	Now at ON Semiconductors

Current students

Ph.D.

Behram Bagheri
Harsh Gaonkar
Laila Poly
Nishtha Bhatnagar
Saba Sharikadze
Junhua Zhu

Post-doctoral Scientist mentoring

1. Balaji Ganapathy (2012- 2016)
2. Ranjith Kottokkaran (2014-current)
3. Dipak Paramanik (2014- 2016)
4. Satyapal Nehra (2015-16) – Raman Scholar from India
5. Mahendra Dhaka (2015-16)- Raman Scholar from India
6. Sharadrao Vhanalkar (2016-17) – Raman Scholar from India

9. Table of Undergraduate REU Students in the last 15 years who have gone on to Ph.D. at other universities

Student	University
Amin Hajimorad(2002)	UC-Berkeley
Seth Hendrickson (2003)	Stanford
Jeremy Booher (2003)	Princeton
Nick Olson (2004)	U. of Illinois-Urbana-Champagne
Jeff Leib (2004)	MIT – Graduated with Ph.D.
Michael Kelzenberg (2005)	CalTech- graduated in 2010
Cole Petersberg (2007)	Georgia Tech
Leah Henze (2007)*	Minnesota
Phil Reusswig (2008)	Stanford
Souvik Gupta (Summer 2008)	Stanford
Ben Curtin (2009)	UC-Santa Barbara
Michael Eggleston(2009)	UC-Berkeley
Amy Berglund (2009)	UC-Berkeley
Brian Lewis (2010)	UC-San Diego
Dan Congreve (2011)	MIT-now at Roland Institute, Harvard
Carin Lightner (2012)*	Cornell
Brian Modtland (2013)	MIT

*Women students

11. Publications in archival journals;

1. V. L. Dalal, " Avalanche multiplication in bulk n-Si", Appl. Phys. Lett., 15, 379(1969)

2. V. L. Dalal, A. B. Dreeben and A. Triano, " Temperature dependence of hole velocity in GaAs", J. Appl. Phys., 42 , 2864(1971

3. V. L. Dalal " Hole velocity in p-GaAs", Appl. Phys. Lett., 16, 489(1970)

4. V. L. Dalal, "Analysis of photoemissive Schottky barrier photodetector", J. Appl. Phys., 42 ,2280(1971)

5. V. L. Dalal, " A simple model for internal photoemission", J. Appl. Phys., 42,2274(1971)

6. V. L. Dalal, " A possible field assisted photocathode", J. Appl. Phys., 42, 2280(1972)
7. V. L. Dalal and M. A. Lampert, " High electric field effects in n-Si", J. Appl. Phys., 43, 4600(1972)

8. V. L. Dalal, A. B. Dreeben and A. Triano, " Reply to comments on hole velocity in GaAs", J. Appl. Phys.,43, (1972)

9. V. L. Dalal and M. A. Lampert, " Transient space charge phenomena in semiconductors at high electric fields", Solid-State Electron., 16 ,689(1973)

10. V. L. Dalal, "Energy, environment and need for new technology", J. Energy Conversion,(1973)

11. V. L. Dalal, H. Kressel and W. Hicinbothem, " Carrier lifetimes in epitaxial InAs", Appl. Phys. Lett., 24, 184(1974**)**

12. H. Kressel, P. Robinson, S. McFarlane, R. D'Aiello and V. L. Dalal , " Characterization of Properties of p-n junctions deposited on Si ribbon substrates", J. Electron. Mater. 3,855(1974)

13. H. Kressel, P. Robinson, R. D'Aiello, R. McFarlane and V. L. Dalal, "Epitaxial Si junctions on Si ribbon substrates", Appl. Phys. Lett., 25, 197(1974)

14. V. L. Dalal, H. Kressel and P. Robinson, " Epitaxial Si solar cell", J. Appl. Phys., 46, 1283(1975)

15. V. L. Dalal and A. Moore, " Design considerations for high intensity solar cells", J. Appl. Phys., 48, 1244(1977)

16. V. L. Dalal and A. Rothwarf, " A comment on simple measurement of solar cell efficiency", J. Appl. Phys., 49 , 2980(1979)

17. P. H. Nielsen and V. L. Dalal, " Thermoelectric power and conductivity of a-Si:F:H films", Appl. Phys. Lett.,37, 1090(1980)

18. V. L. Dalal, "Analysis of a-Si solar cells", Solar Cells, 2 , 261(1980)

19. V. L. Dalal, " Design considerations for a-Si solar cells", IEEE Trans. Electron Devices, ED-27, 662(1980)

20. V. L. Dalal and F. Alvarez, " Transport properties of minority carriers in a-Si:H n-i-p junctions", J. de Phys., 42, C-4, 491(1981)

21. T. W. F. Russell and V. L. Dalal, " The potential for thin film photovoltaic cells", IEEE Trans. on Education, E-24, 239(1981)

22. M. Akhtar, V. L. Dalal, J. Cambridge, K. Ramaprasad and S. C. Gau, " Electronic and optical properties of CVD a-Si films", Appl. Phys. Lett., 41, 1146(1982)

23. R. Knox, V. L. Dalal and O. Popov, " Characterization of electronic and optical properties of a-Si:H films grown using ECR plasma", J. Vac. Sci. Tech. A9 , 474(1991)

24. E. X. Ping and V. L. Dalal, " Electron-hole quantum confined states affected by point charge in semiconductor crystallites", Solid State Comm., 82, 749(1992)

25. E. X. Ping and V. L. Dalal, " Exciton photoluminescence of quantum wells affected by thermal migration and inherent interface fluctuation", J. Appl. Phys., 74, 5349 (1993)

26. E. X. Ping and V. L. Dalal, "Energy levels of single and coupled quantum wells embedded in cylindrical buffer barriers affected by magnetic field", Journal of Applied Physics, 76, 2547(1994)

27. E. X. Ping and V. L. Dalal, Resonant tunneling of plane, cylindrical, and spherical double barrier quantum wells - Journal of Applied Physics, 73, 5289(1993)

28. V. L. Dalal, R. Knox and B. Moradi, "Measurement of Urbach edge and midgap states in a-Si p-i-n devices", Solar Energy Materials and Solar Cells, 31, 346(1993)

29. V. L. Dalal, G. Baldwin, M. Leonard, "Fabrication of a-Si materials and solar cells at high temperatures using ECR plasma deposition techniques", J. Non-cryst. Solids, 71-74, 166(1993)

30. B. Moradi, V. L. Dalal and R. Knox, " Properties of poly-Si films deposited on amorphous substrates using reactive plasma beam deposition technique", J. Vac. Sci. Tech. A12, 251(1994)

31. R. D. Knox, B. Moradi, V. L. Dalal and G. Chumanov, "Amorphous and polycrystalline Si films deposited using ECR reactive plasma deposition", J. Vac. Science and Tech. A 11,1896(1993)

32. V. L. Dalal, E. X. Ping, S. Kaushal, M. Bhan, and M.Leonard, " Growth of a-Si:H films with significantly improved stability", Appl. Phys. Lett., 64 , 1862 (1994)

33. S. DeBoer, V. L. Dalal, R. Bartel and G. Chumanov, " Low temperature epitaxial growth of Si films using high vacuum ECR plasma deposition", Appl. Phys. Lett., 66 , 2528(1995**)**

34. S. Kaushal, V. L. Dalal and J. Xu, "Growth of high quality a-(Si,Ge):H films using low pressure remote ECR discharge, J. Non-Cryst. Solids, 198-200, 563(1996)

35. D. Grimmer, F. Jeffrey, S. Marten, M. Noack and V. L. Dalal, " Lightweight, flexible, monolithic thin-film amorphous silicon modules on continuous polymer substrates", Intl. J. of Solar Energy, 1996

36. V. L. Dalal, S. Kaushal and R. Girvan,, "Improvements in stability of a-Si:H solar cells", J. Non-crystalline Solids, 198-200, 1101(1996)

37. T. W. F. Russell, V. L. Dalal, R. Gay and S. Guha, "Design of critical experiments for scale-up", Prog. In Photovoltaics, 5, 353(1997)

38. V. L. Dalal, T. Maxson and Kay Han, " Significant improvements in stability of a-Si:H single and tandem junction solar cells made using ECR plasma deposition", J. Non- Cryst. Solids,227,1257(1998)

39. J. Shinar, R. Shinar, D. Williamson, S. Mitra and V. Dalal , "Microstructure and hydrogen dynamics in hydrogenated amorphous (Si,C)" Phys. Review B.60, 15875(1999)

40. J. Herrold and V. L. Dalal, " Growth and properties of microcrystalline (Ge,C)", J.Non- Cryst. Solids., 270, 255(2000)

41. V. L. Dalal, S. Haroon, Zhiyang Zhou, T. Maxson and K, Han, "Influence of plasma chemistry on the properties of a-Si,Ge:H alloys", J.Non-Cryst. Solids, 266,675(2000)

42. K. Erickson and V. L. Dalal, " Growth of microcrystalline Si and (Si,Ge) films on plastic substrates", J.Non-Cryst. Solids, 266, 685(2000)

43. V. L. Dalal, "Fundamental considerations of growth chemistry of a-Si and alloys" Thin Solid Films 395, 173(2001)

44. S. R. Sheng, M. Boshta, R. Braunstein and V. L. Dalal, " On the transport properties of a-(Si,Ge) alloys", J. Non-Cryst. Solids , 303, 202 (2002)

45. Vikram L. Dalal, Yong Liu , Zhiyang Zhou and Keqin Han, "Growth and Properties of Low Bandgap amorphous (Si,Ge) Alloy Materials and Devices", J. Non-Cryst. Solids, 299-302, 1127(2002)

46. Vikram L. Dalal, Paul Seberger, Matt Ring and Puneet Sharma, " Growth of a-Si films using combined hot wire-ECR process", Thin Solid Films 430, 91(2003**)**

47. Vikram L. Dalal, "Growth chemistry of a-Si and a-(Si,Ge)"(Invited paper), Current Opinions in Solid State Materials, 6, 455 (2002)

48. Vikram L. Dalal, Matt Welsh, Max Noack and J. H. Zhu, "Microcrystalline Si:H Cells Grown Using ECR Plasma Process", (Invited paper), IEE Proc.-Circuits, Devices and Syst. 150, 316(2003)

49. Jianhua Zhu ,V. L. Dalal, J.D. Cohen, M. Ring " Properties of a-Ge:H films and devices", J. Non-Cryst. Solids, 338-340 651(2004)

50. M. A. Ring, V. L. Dalal and K. Muthukrishnan, "Properties of a-Si and a-(Si,Ge) films grown using combined ECR-hot wire processes", J. Non-cryst. Solids 338-340, 61 (2004)

51. M. Boshta, K. Barner, R. Braunstein, B. Alavi and V. L. Dalal, "Determination of trap density differences in microcrsytalline (Si,Ge):H alloys", Materials Science and Engineering B: Solid-State Materials for Advanced Technology, v 112, 69-72 (2004)

52. Vikram L. Dalal, J. Graves and J. Leib, " Influence of pressure and ion bombardment on the growth and properties of nanocrystalline Si materials", Appl. Phys. Lett., 85, 1413(2004**)**

53. Vikram Dalal, Puneet Sharma " Diffusion length and defect densities in nanocrystalline Si solar cells" Appl. Phys. Lett. 86, 103510 (2005)

54. M. Boshta, B. Alavi, R. Braunstein, K. Bärner and V.L. Dalal, "Electronic transport properties of the μc-(Si,Ge) alloys prepared by ECR deposition", Solar Energy Mater. and Solar cells, 87, 387(2005)

55. Xuejun Niu and Vikram L. Dalal "Growth and properties of nanocrystalline germanium films" J. Appl. Physics, 98, 096103 (2005)

56. Ruth Shinar, D. Ghosh, B. Chouduary, M. Noack, V. L. Dalal and J. Shinar, "Oxygen sensor structurally integrated with LED and a-Si photodetector",J. Non- Cryst. Solids, 352, 1995 (2006)

57. Vikram Dalal, Kamal Muthukrishnan, Xuejun Niu and Daniel Stieler, "Growth chemistry of nanocrystalline Si and Ge films", J. Non-Cryst. Solids, 352, 892(2006)

58. Nanlin Wang and Vikram Dalal "Improving stability of amorphous Si using chemical annealing with helium", J. Non-Cryst. Solids, 352, 1937(2006)

59. Dan Stieler, Vikram Dalal, Max Noack and Eric Schares, "Electron mobility in nanocrystalline Si", J. Appl. Phys. 100, 036106(2006)(2006**)**

60. J. Huguenin-Love, R. J. Soukup, N. J. Ianno, J. S. Scharder , D. W. Thompson and V. L. Dalal, "Optical and crystallographic analysis of thin films of GeC deposited using a unique hollow cathode sputtering technique" , Materials Science in Semiconductor Processing, 9, 759 (2006)

61. J.S. Schrader, J.L. Huguenin-Love, R.J. Soukup, N.J. Ianno, C.L. Exstrom, S.A. Darveau, R.N. Udey and V.L. Dalal**, "**Thin films of GeC deposited using a unique hollow cathode sputtering technique" Solar Energy Materials and Solar Cells, 90, 2338(2006)

62. S. Saripalli, P. Reusswig, P. Sharma and V. L. Dalal, "Transport properties of nanocrystalline Si and (Si,Ge)" , J. Non-cryst. Solids, 354,2426-2429 (2008)

63. A. Madhavan and V. L. Dalal, "Alternative designs for Nanocrystalline Si Solar cells", J. Non-Cryst. Solids, 354, 2403-2406(2008)

64. V. Jaju and V. L. Dalal, "Growth and Proeprties of Fluorinated Plasma oxide for MOSFET devices", J.Non-Cryst. Solids, 354, 2839-2842 (2008)

65. D. Ghosh, R. Shinar, V. L. Dalal, Z. Zhou and J. Shinar "Amorphous and nanocrystalline Si p-i-n photodetectors for integrated oxygen sensors", J.Non-Cryst. Solids , 354,2606-2609(2008)

66. J. L. Huguenin-Love, R. J. Soukup, N. Ianno, J. Scharder, D. W. Thompson and V. L. Dalal, "Optical and crystallographic analysis of thin films of GeC deposited using a unique hollow cathode sputtering technique "Materials Science in Semiconductor Processing, 9 , 759 (2006)

67. C. Jariwala, A. Chainani, R. Eguchi, M. Matsunami, S. Shin, S. Bhat, V. Dalal and P.I. John, "Low power density multihole cathode VHF plasma for mixed phase Si:H thin films", Appl. Phys. Lett. 93, 191502(2008)

68. B. Curtin, R. Biswas and V. L. Dalal, "Photonic crystal based back reflectors for light management and enhanced absorption in amorphous silicon solar cells " Appl. Phys. Lett. 95, 231102 (2009**)**

69. R. Biswas ,J. Bhattacharya, B. Lewis, N. Chakravarty, V.L. Dalal, "Enhanced Nanocrystalline Silicon Solar cell with a Photonic Crystal Back Reflector", Solar En. Mater. And Solar Cells (2010**)**

70. J. Bhattacharya, N. Chakravarty, S. Pattnaik, D.Slafer, R. Biswas and V. L. Dalal: "A photonic-plasmonic structure for enhancing light absorption in thin film solar cells" Appl. Phys. Lett., 99 Article Number: 131114(2011)

71. D. Congreve, S. Kajjam, V. L. Dalal" Influence of oxygen on defect densities in nanocrystalline Si solar cells", J. Non-Cryst. Solids , 358,2071(2012**)**

72. S. Pattnaik, J. Bhattacharya, N. Chakravarty, D. Slafer, R. Biswas and V. L. Dalal, "Efficient Thin Film Si Solar Cells on Modified Conical Photonic-Plasmonic Structures" J. Non-Cryst. Solids , 358,2313(2012)

73. J. Bhattacharya, R. W. Mayer, M. Samiee and V. L. Dalal, "Photo-induced changes in fundamental properties of organic solar cells", Appl. Phys. Lett. 100, 193501 (2012)

74. Yifen Liu, Rabin Dhakal, Vikram Dalal, and Jaeyoun Kim, "Polarization diverse light absorption enhancement in organic PV structures with one dimensional long-pitch structures: Theory and experiments" Appl. Phys. Lett., 101,233904 (2012)

75. S. Pattnaik, T. Xiao, R. Shinar, J. Shinar and V. L. Dalal, "Hybrid inorganic-organic solar cell" IEEE J. of Photovolt.,**3**, 295(2013)

76. R. Biswas, S. Pattnaik, J. Bhattacharya, Chun Xu, N, Chakravarty and Vikram Dalal, "Enhancement in solar cell performance with photonic and plasmonic crystals: Overcoming the Lambertian Limit", J. Mater. Research. 28, 1021(2013)

77. S. Kajjam, S. Konduri and V. L. Dalal, " Influence of oxygen on minority carrier lifetimes and defect densities in nanocrystalline Si ", Appl. Phys. Lett., 103, 093506 (2013)

78. Ganapathy Balaji, Mehran Samiee, Pranav Joshi, Malika Jeffries-El and Vikram L. Dalal, "Synthesis and photovoltaic properties of a furan-diketopyrrolopyrrole-fluorene terpolymer ", European Polymer Journal, 49, 3921(2013)

79. Mehran Samiee, Brian Modtland, Damir Aidarkhanov and Vikram L. Dalal, "More stable hybrid organic solar cells deposited on amorphous Si electron transfer layer" Appl. Phys. Lett. 104 , 213909 (2014)

80. Mehran Samiee, Pranav Joshi, Damir Aidarkhanov and Vikram Dalal, "Defect densities and tail states in PTB7", App. Phys. Lett., 105 , 133511 (2014)

81. R. Biswas, S. Pattnaik. N. Chakravarty, Vikram Dalal, D. Slafer, "Nano-Photonic and Nano-Plasmonic Enhancement in thin film Si solar cells" Solar En. Mater. And Solar cells, 129, 115(2014)

1. 82. Mehran Samiee, Siva Konduri, Balaji Ganapathy, Ranjith Kottokkaran, Hisham A. Abbas, Andrew Kitahara, Pranav Joshi, Liang Zhang, Max Noack and Vikram Dalal , "Defect density and dielectric constant in perovskite solar cells", Appl. Phys. Lett**., 105,** 153502 (2014)

83. Hisham Abbas, Ranjith Kottokkaran, Mehran Samiee, Liang Zhang, Balaji Ganapathy, Andrew Kitahara, Max Noack and Vikram L. Dalal, "High Efficiency Sequentially Vapor Grown n-i-p $CH_3NH_3PbI_3$ Perovskite Solar Cells with Undoped P3HT as p-type Heterojunction Layer", APL Mat. **3** , 016105 (2015)

84. Ganapathy Balaji, Pranav H. Joshi, Hisham A. Abbas, Liang Zhang, Ranjith Kottokkaran, Mehran Samiee, Max Noack, and Vikram Dalal, Ganapathy Balaji, Pranav H. Joshi, Hisham A. Abbas, Liang Zhang, Ranjith Kottokkaran, Mehran Samiee, Max Noack, and Vikram Dalal, "*CH3NH3PbI3 from non-*

iodide lead salts for perovskite solar cells via the formation of PbI2", Physical chemistry chemical physics : PCCP **17** (16), 10369 (2015)

85. B. Maynard, Q. Long, M. J. Yan, E. Schiff, K. Zhu, R. Kottokkaran, H. Abbas and Vikram Dalal, "Electron and Hole drift mobility measurements on methylammonium iodide perovskite solar cells", Appl. Phys. Lett.108, 173505(2016)

86. P. Joshi, L. Zhang, I. Hossain, H. A. Abbas, R. Kottokkaran, S. P. Nehra, M. Dhaka, M. Noack and Vikram Dalal, "Physics of photo-degradation of perovskite solar cells" AIP Advances, 6, 115114 (2016)

87. Rahul Singh, Ranjith Kottokkaran, Vikram Dalal and Ganesh Balasubramanian"Engineering Band Gap and Electronic Transport in Organic-Inorganic Halide Perovskites by Superlattices", Nanoscale, 9, 8600 (2017)

88. J. Bhattacharya, P. H. Joshi, R. Biswas and V. L. Dalal," Pathway for recovery of photo-degraded polymer solar cells by post degradation thermal anneal", Solar En. Mater. And Solar cells, 164, 70 (2017)

89. Satvik Shah, Rana Biswas, Thomas Koschny, Vikram Dalal," Unusual Infrared Absorption Increases in Photo-degraded Organic Films", Nanoscale, 9, 8665 (2017)

90. Akshit Peer, Pranav Joshi, Rana Biswas and Vikram Dalal, "Blue photon management by in house grown ZnO:Al cathode for enhanced photostability in polymer solar cells" Solar Energy Materials and Solar Cells, 179, 95 (2018)

91. J. Bhattacharya, R. Biswas and Vikram Dalal, "Surface States & Interface States-Two Fundamental Source of Photo-degradation in Organic Bulk Heterojunction Devices", Accepted for publication in IEEE Journal of Photovoltaics (2018)

92. Ranjith Kottokkaran, Harsh Gaonkar, B. Bagheri and Vikram Dalal, "Efficient p-i-n inorganic CsPbI3 perovskite solar cell deposited using layer-by-layer vacuum deposition" JVST A, 36, 041201 (2018)

12. Proceedings Articles, refereed

1. V. L. Dalal, "Technology considerations for a-Si solar cells", Proc. of The Metallurgical and Materials Soc., (1979)
2. A. W. Catalano, V. L. Dalal, E. A Fagen and R. B. Hall, " Zinc phosphide : a promising photovoltaic material", Proc. of 13th. IEEE Photovolt. Spec. Conf., 288(1978) **[8]**
3. V. L. Dalal, " Design and technology of Si cells for concentrator applications", Proc. of 13th. IEEE Photovolt. Spec. Conf., 1040(1978)
4. A. W. Catalano, V. L. Dalal, E. A. Fagen and R. B. Hall, "Zinc Phosphide: A new photovoltaic material", Proc. of European Conf. on Photovolt., (1978)
5. V. L. Dalal, B. N. Baron and T. W. F. Russell, " Technology considerations for thin film solar cells", Proc. of AS-Int'l. Solar Energy Soc., 3.2, 981(1980)
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93. Ashutosh Shyam, Daniel Congreve, Max Noack and Vikram Dalal, "Properties of a-(Si,Ge) materials and devices grown using chemical annealing",Proc. Of MRS, Vol.1321(2011)
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95. S. Pattnaik, T. Xiao, R. Shinar, J. Shinar and V. L. Dalal, "Hybrid inorganic/organic tandem junction solar cell" Proc . of 38th. IEEE PV Conf.(2012)
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97. S. Konduri, V. L. Dalal, "Grain Growth and Mobility in Nanocrystalline Ge and (Si,Ge) Films", Proc. Of MRS (2012)
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100. Zhao Li and Vikram Dalal, " Influence of chemical annealing on electronic properties and stability of a-(Si,Ge) films and devices", Proc.of. IEEE PVSC (2013)
101. S. Konduri, W. Mulder and V.L. Dalal, "Defect and Doping Properties in Nanocrystalline (Si,Ge) Devices", Proc. Of MRS (2014)
102. Joydeep Bhattacharya, Pranav Joshi, Robert Mayer and Vikram L. Dalal, "Reversing Degradation of Organic Solar cells", Proc. Of IEEE PVSC ((2014)
103. Ranjith Kottokkaran, Hisham Abbas, Ganapathy Balaji, Liang Zhang, Mehran Samiee, Andrew Kitahara, Max Noack and Vikram Dalal, "Highly Reproducible Vapor Deposition Technique, Device Physics And Structural Instability Of Perovskite Solar cells, Proc. Of 42nd. IEEE PVSC(2015)
104. Pranav Joshi, Liang Zhang, Ranjith Kottokkaran, Hisham Abbas, Istiaque Hossain, Satyapal Nehra, Mahendra Dhaka, Max Noack and Vikram Dalal, "Physics of Instability of Perovskite Solar Cells", Proc. Of 43rd. IEEE PVSC (2016)

105. Vikram Dalal, Istiaque Hossain, Liang Zhang, Ranjith Kottokkaran, Mohamed El-Henawey, Max Noack, “Influence of Grain Size and Interfaces on Photo-Stability of Perovskite Solar Cells”, Proc. of 44th IEEE PVSC (2017)
106. Satvik Shah, Rana Biswas, Thomas Koschny, Vikram Dalal, Identification of Degradation Pathways of Organic Solar Cells using Infrared Spectroscopy , Proc. of 44th. IEEE PVSC (2017)
107. Istiaque Hossain, Liang Zhang, Mehran Samiee, Pranav Joshi, Ranjith Kottokkaran, Max Noack, Vikram L. Dalal, Photo-degradation of perovskite solar cells: Modeling and Simulation, Proc. of 2018 World Photovoltaic Energy Conference (Hawaii)
108. Ranjith Kottokkaran, Harshavardhan A Gaonkar, Istiaque Hossain, Max Noack, Vikram L Dalal, Layer by Layer deposition of $CsPbI_3$ perovskite: Device optimization and Characterization , Proc. of 2018 World Photovoltaic Energy Conf.(Hawaii)

13. Patents

PAT. NO. Title
citations (as of 10/8/2013)

7,718,130 Integrated thin-film sensors and methods (2010)
Co-Inventors: R. Shinar, J. Shinar

4,692,558 Counteraction of semiconductor impurity effects :

4,604,636 Microcrystalline semiconductor method and devices :

4,485,128 Bandgap control in amorphous semiconductors :

4,478,654 Amorphous silicon carbide method (co-inventor, S. Gau)

4,477,688 Photovoltaic cells employing zinc phosphide :
(Co-inventor)

4,465,706 Bandgap control in amorphous semiconductors :

4,387,265 Tandem junction amorphous semiconductor photovoltaic cell :

4,377,723 High efficiency thin-film multiple-gap photovoltaic device :

4,253,882 Multiple gap photovoltaic device

4,251,287 Amorphous semiconductor solar cell :

3,988,167 Solar cell device having improved efficiency :
Co-Inventor: H. Kressel

14. Invited Talks

1. Purdue University, Lafayette, In (1989)
   " Stability of amorphous semiconductors"

2. University of Delaware, Newark, DE(1991)
   " Amorphous Si,Ge alloys"

3. Indian Institute of Technology, Madras (1997)
   " Amorphous semiconductors"

4. National Physical Laboratory, New Delhi, India (1997)
   " Thin film semiconductors"

5. CNRS, Ecole Polytechnique, Paliseau, France (1998)
   " Growth and properties of high quality a-(Si,Ge) devices"

6. Institute for Plasma Physics, Ahmedabad, India (1998)
   " Plasma processing for semiconductors"

7. National Physical Laboratory, New Delhi, India (1998)" New Developments in thin film semiconductors"

8. University of Utrecht, Netherlands (1998)
   " Growth of high quality a-(Si,Ge) materials and devices"

9. National Renewable Energy Laboratory, Golden, Co. (2000)" How do we achieve high deposition rates in a-Si and alloys?

10. National Renewable Energy Laboratory, Golden, Co (2001)
    " Growth chemistry of amorphous and microcrystalline semiconductors"

11. Tata Institute for Fundamental Research, Bombay, India (2001)
    "Growth and properties of low gap a-(Si,Ge) alloys"

12. National Physical Laboratory, New Delhi, India (2001)
    "Fundamentals of Growth Chemistry of Thin Film Semiconductors"

13. Indian Assn. For Cultivation of Science and Jadavpur University, Calcutta, India (2001)
    "Properties of amorphous semiconductors"

14. University of Nebraska, Lincoln (2001)

" Fundamental properties of amorphous semiconductors"

15. Indian Inst. Of Technology-Kanpur (India) (2002)
" Microcrystalline Si solar cells"

16. Indian Inst. Of Technology-Delhi (India) (2002)
" Thin film Si for solar cells"

17. Tech. University of Eindhoven, Eindhoven, Netherlands (2002)
" Transport in microcrystalline Si:H materials and solar cells"

18. Tech. University of Delft, Delft, Netherlands (2002)
" Microcrystalline Si solar cells"

19. National University of Singapore (2003)
" Nanocrystalline Si for electronic devices"

20. NTU- Singapore (2003)
" Nanocrystalline Si:H – a new electronic material"

21. Gordon Research Conference on Electronic Materials, July 2003
"Growth chemistry of thin film Si"

22. University of Louisville, 2003
" Nanocrystalline Si"

23. Indian Inst. Of Technology-Bombay(India) (2003)
" Microcrystalline Si:H for electronic applications"

24. International Workshop on Physics of Semiconductor Devices, IIT, Madras, India
(Co-sponsored by IEEE) " Nanocrystalline Si solar cells"

25. Institute for Plasma Research, Ahmedabad, India (2004)
"Plasmas in photovoltaic technology"

26. National renewable Energy Laboratory, Golden, Co. (2004)
" Nanocrystalline Si:H – Material properties, device physics and research directions"

27. Institute for Plasma Research, Ahmedabad, India (2004)
"Plasmas in photovoltaic technology"

28. Tech. University of Delft, Netherlands (2004)
" Growth chemistry and Device physics of nanocrystalline Si:H"

29. Indian Inst. Of Technology-Madras (2005)
" Material and Device properties of nanocrystalline Si"
IEEE-EDS Distinguished Lecture

30. Indian Inst. Of Technology-Bombay (2005)
" Material properties of nanocrystalline Si and its applications for solar cells"
IEEE-EDS Distinguished lecture

31. Int'e Workshop on Physics of Semiconductors (sponsored by IEEE), National Physical lab., New Delhi, India (2005)
"Improving stability of a-Si by chemical annealing"

32. Tata Inst. Of Fundamental Research, Mumbai, India (2005)
"The photovoltaic challenge: Perspectives for India"

33. National Physical lab., New Delhi, India (2005)
"Physics of nanocrystalline Si solar cells"

34. Cambridge University, UK (2005)
" Physics and technology of Nanocrystalline Si for Photovoltaic Energy Conversion Applications"

35. Tata Institute of Fundamental research, Bombay, India (2005)
"Stability considerations in a-Si"

36. Materials Research Society (2006) :
"Growth and Physics of nanocrystalline Si and (Si,Ge) Devices"

37. University of Nebraska, Lincoln (2006)
"Nanocrystalline materials for solar energy conversion"
IEEE- EDS Distinguished lecture

38. University of Iowa (2006)
"Nanocrystalline Si for PV Energy Conversion"

39. University of New Mexico, Albuquerque,NM (2007)
"Nanocrystalline Si for photovoltaic energy conversion"
IEEE EDS Distinguished Lecture

40. Indian Inst. Of Technology, Bombay (2007)
"Growth and Properties of Nanocrystalline Si for photovoltaic energy conversion"
IEEE-EDS Distinguished Lecture

41. Ohio State University (2007), Columbus, OH
"Physics and Technology of Nanocrystalline Si for Solar Energy Conversion"
IEEE-EDS Distinguished Lecture

42. Vishwakarma Inst. Of Technology, Pune, India (2007)
"Photoovoltaic Energy Conversion"
IEEE-EDS Distinguished Lecture

43. South Dakota State University, Brookings, SD (2007)
"Solar Energy Conversion technology"
IEEE-EDS Distinguished Lecture

44. International Workshop on Physics of Semicond. Devices (2007)
Indian Inst. Of Technology-Bombay, India
Tutorial on Thin Film Solar Cells

45. Hahn Meiner Institute, Berlin, Germany (2007)
Growth and Properties of Nanocrystalline Si

46. Indian Institute of Technology, Kanpur(India) (2008)
Indian Photovoltaic Conference
Tutorial on nanocrystalline Si solar cells

47. Indian Photovoltaic Conference, IIT-Kanpur,India (2008)
"Superlattice Nanocrystalline Si solar cells"

48. International Workshop on Optical Properties of Materials, Edmonton, Canada (2008)
"Physics of Nanocrystalline Si solar cells"

49. International Conference on Photovoltaic Science and Technology, Kolkata, India (1/2009)
"Physics of Nanocrystalline Si Solar cells"

50. Tata Inst. Of Fundamental Research, Bombay, India (12/2008)
"The Energy Problem and Some Solutions for the World and India"

51. Institute for Plasma Research, Ahmedabad, India (12/2008)
"Energy Crisis and Role of Conservation and Solar Energy in India"

52. U. of Kentucky, Lexington, KY (2/2009)
"Physics of Nanocrystalline Silicon Solar Cells" **IEEE EDS Distinguished Lecture**

53. NJ Inst. Of Technology, NJ (3/2009)
"The Energy Problem and Potential Solutions", **IEEE EDS Distinguished Lecture**

54. Indian Institute of Management, Ahmedabad, India (1/2009) :
"Energy Crisis and the Role of Solar Energy and Conservation Strategies for India"

55. Saha Institute for Nuclear Physics, Calcutta, India (1/2009)
"Energy Crisis and Critical Directions for Energy Research for India"

56. Indian Institute of Technology, Bombay, India (1/2009)
"Energy Crisis and the Role for Solar Energy"
IEEE EDS Distinguished Lecture

57. International Workshop on Physics of Semiconductor Devices (Delhi, India, Dec. 2009)
IEEE-EDS sponsor-2 hour lecture on "Thin Film Photovoltaic Science and technology"

58. Physical Research Lab., Ahmedabad, India (Dec. 2009)
"Energy Crisis and Strategies for India"

59. IIT-Kanpur (India), Short course, Jan. 2010
"Thin Film Photovoltaics",

60. IIT-Kanpur (India), Jan. 2010, **Plenary Talk**
"Thin film Si PV Science and Technology"

61. Physical research Laboratory-India (2010)
"Global warming and potential solutions"

62. U. Of Iowa (11/2010) - **IEEE EDS Distinguished Lecture**
"Energy Problems and Role of Solar Energy"

63. IIT-Bombay (India) , Jan. 2011, **IEEE EDS Distinguished Lecture**
"Renewable Energy –A Comparative Study: India, China and the U.S."

64. TIFR-Bombay (India): (2011)
"A Comparative Analysis of Energy Strategies of China, India and the U.S."

65.T. Shanai College of Engineering, Bombay, India (Jan. 2011), **IEEE-EDS Dist.lecture**
"Energy Strategies for India and the Role of Solar Energy"

66-70 A series of lectures:
U. of Cochin, India , March 2011
1. “Perspectives on Energy” – **IEEE EDS Distinguished Lecture**
2. “Status of Solar Energy technology”
3. “Thin Film Si PV Technology”
4. “Nanocrystalline Silicon PV Science and Technology”
5. “Organic Semiconductor PV Technology”

71. International reliability Physics Symp. (2011)
“Physics of degradation of a-Si and a-(Si,Ge) solar cells”

72. Tata Inst. of Fundamental Research, Bombay, India (2012)
“Physics of instability in organic solar cells”

73. E-Science Nano conference , Malaysia(2012)-Plenary Talk
“Role of Solar Cell Technology in Global Energy”

74. IIT-Bombay,India. (2012)
Joint Indo-US Workshop on Frontiers of Photovotlaic Technology
“Fundamental changes in properties of organic solar cells upon photo-induced degradation”

75. Caltech (2011)
“Thin film solar cells on plasmonic substrates”

76. International Reliability Physics Symp.(2012)
“Physics of degradation of organic cells”

77. **IEEE Webinar (2011**): “Physics of Solar cells” **IEEE EDS Distinguished Lecture**

78. NSF Workshop on Energy Education, Atlanta, GA(2011)
“Energy Storage Technology”

79. IEEE Webinar (2012) “Advanced Solar cells”, **IEEE EDs Distinguished Lecture**

80. Massachusetts Institute of Technology (Fall 2012) : “Physics of degradation of organic solar cells”

81. NSF Workshop at Purdue University on Modeling Needs in Photovoltaic Energy Conversion(Summer 2012)

82. **IEEE-EDS Mini Colloquium**, U. of Maryland-Baltimore, September 2012, “Solar Photovoltaic Energy Conversion”, **IEEE-EDs Distinguished Lecture**

83. IEEE-Photonics Conference, San Francisco, CA, (2012), Tutorial on Photovoltaic Energy Conversion

84. International Conf. on Emerging Electronics (2012), IIT-Bombay, India : “Perspective on advances in photovoltaic energy conversion”

85. NSF-ONR workshop on Organic Solar cells, Arlington, VA (2012). “Physics of degradation of organic solar cells”

86. NSF-India workshop on organic solar cells (2013) “Device physics of organic solar cells”

87. University of Missouri (2013), “Photovoltaic Energy Conversion: Status and Future Prospects”

88. IIT-Bombay: “Stability physics of organic solar cells”, **IEEE-EDS Dist.Lecture** (2013)

89. University of Nebraska (Lincoln), “Physics of organic solar cells” (2013)

90. University of Delaware , “Perovskite solar cells : The New Frontier” (2014)

91. US-India workshop on organic solar cells , Kanpur, India: “ Stability of organic solar cells” (2014)

92. Indian Inst. Of Science, Bangalore (India) : “Perovksite solar cells” (2014)

93. IIT-Bombay “ Perovskite solar cells” (2014)

94. IIT-Madras “Perovsktie Solar Cells: Potential for PV” (2014) **IEEE-EDS Dist. Lecture**

95. IIT-Bombay, India “Perovskite cells: Promise and Problems” (Jan 2015)

96. IISc, Bangalore, India “ Perovskite solar cells: Problems and promise” (2015)

97. U. of Tennessee, “Perovskite solar cells” (2015)

98. Weizmann Institute (Israel), “Perovskite solar cells: The new frontier – problems and promises” (2015)

99. South Dakota State University, “Perovskite solar cells” (2015)

100. University of Delaware, “Promises and problems of perovskite solar cells” (2015)

101. National Chemical lab., Pune, India (2016) : “Perovskite solar cells: the new frontier”

102. Old Dominion University, Norfolk, VA (2016) “Perovskite solar cells: The New Frontier in Photovoltaics” **IEEE EDS Distinguished lecture**

103. IIT-Bombay (2016). 3 hour Tutorial on “Physics of perovskite solar cells”. A national workshop attended by ~50 students and 15 faculty/researchers from all over India.

104. IIT- Bombay (2016) “Physics of instability of perovskite solar cells”

105. U. of Houston (2017) “ Perovskite solar cells : Potential and problems” , **IEEE EDS Distinguished Lecture**

106. U.of Iowa, “New Developments in Photovoltaics”, Oct. 2017 , **IEEE EDS Distinguished Lecture**

107. IIT-Bombay “Recent development in photovoltaics” (1/2018), **IEEE-EDS Minicolloquium and Distinguished Lecture**

108. Indian Institute of Science, Bangalore, India, “Recent developments in photovoltaics”, (1/2018), **IEEE EDS Minicolloquium Distinguished Lecture**

109. IIT-Delhi: “New Developments in Photovoltaics” (4/2018)

110. IIT- Madras : “Stability physics of perovskite devices” , I**EEE EDS Distinguished Lecture** (10/ 2018)

111. IIT- Delhi : “ Physics of instability of perovskite solar cells”, **IEEE EDS Distinguished Lecture** (10/2018)

112. IIT- Bombay, “New developments in understanding of the photo-stability of perovskite solar cells” **IEEE EDS Distinguished Lectur**e (10/2018)

15.Contributed talks:

~50 talks/posters at Materials Research Society Annual Spring Meeting (Symp. A)

~23 talks/posters at International Conference on Amorphous and Microcrystalline Semiconductors

2 talks at International Conf. On Catalytic CVD of Si

45 talks/posters at IEEE Photovoltaic Conf. (From 1978 onwards)

12 talks/posters at conferences organized under sponsorship of Amer. Inst. Of physics