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Education

- Ph.D. Physics, Jadavpur University, Kolkata – 700 032, India, 1998. Thesis title:
“Development of photovoltaic grade amorphous silicon based materials by
controlling structural properties with argon dilution of silane plasma”
- M. Sc. Physics, Visva Bharati University, Santiniketan, West Bengal, India, 1991
- B. Sc. Physics, Visva Bharati University, Santiniketan, West Bengal, India, 1989

Professional Experience

- 09/2023 – Present: Senior Scientist, Institute of Energy Conversion (IEC), University of Delaware
- 06/2021 – present: Associate Professor (Secondary appointment), Department of Electrical and Computer Engineering (ECE), University of Delaware
- 09/2020 – present: Associate Professor (Secondary appointment), Department of Materials Science and Engineering (MSEG), University of Delaware
- 01/2012 – 08/2023: Associate Scientist, Institute of Energy Conversion (IEC), University of Delaware
- 09/2007 – 12/2011: Research Associate III, IEC, University of Delaware
- 07/2004 – 08/2007: Limited Term Researcher, IEC, University of Delaware
- 11/2000 – 06/2004: R&D Scientist, MV Systems Inc., Golden, Colorado
- 11/2000 – 08/2002: Research Faculty of Advanced Coatings and Surface Engineering Laboratory (ACSEL), Dept. Of Metallurgical and Materials Engineering, Colorado School of Mines, Golden, Colorado
- 1/1999 – 10/2000: Research Scientist, Joint Research Center for Atom Technology (JRCAT), Tsukuba, Ibaraki, Japan
- 1997–1998: Research Associate, Council of Scientific and Industrial Research (CSIR)-Govt. of India, Indian Association for the Cultivation of Science (IACS), Jadavpur, Calcutta-32, India

AWARDS

1. Junior Research Fellowship from Council of Scientific and Industrial Research (CSIR), Govt. of India, 1991.
2. Research Associate of Council of Scientific and Industrial Research (CSIR), Govt. of India, 1997.

3. Best paper presentation award at National Solar Energy Convention held in Chennai, India, 1997.
4. Young Scientist award from International Union of Crystallography, 1998.
5. Young Researcher award from Japan Society of Applied Physics, 2000.
6. Invited attendee as a guest scientist at Joint Research Center of Atom Technology (JRCAT) symposium held at Tokyo, Japan, 2001.

INVITED TALKS AND SEMINARS

1. "Temperature dependent H penetration in a-Si:H films" – Presented at Tokyo Institute of Technology, Japan, July 29, 1999.
2. "Evolution of surface dangling bonds during a-Si:H film growth observed by *in-situ* ESR measurement" – Presented at the 26th seminar on Amorphous materials (held at Hotel Regalo Fukuoka, Japan, November 11 - 12, 1999).
3. "Evolution of Si dangling bonds during growth and H treatment of a-Si:H films" - Presented at NREL a-Si team meeting, May 31 – June 1, 2001 held at Colorado School of Mines, CO 80401, USA.
4. "Microcrystalline silicon materials and solar cells grown by pulsed PECVD technique" - Presented at 12th semiannual Advanced Coating and Surface Engineering Laboratory (ACSEL) workshop, Nov. 29 – 30, 2001 held at Colorado School of Mines, CO 80401, USA.
5. "Pulsed PECVD grown nc-Si: Potential applications in solar cell and TFT on rigid and flexible substrates" - Presented at 14th semiannual Advanced Coating and Surface Engineering Laboratory (ACSEL) workshop, April 24 – 25, 2003 held at Colorado School of Mines, CO 80401, USA.
6. "Theory and practice of amorphous and nano-crystalline silicon single junction solar cells" - Presented at Corning Inc., Corning, NY, July 28, 2010.
7. "Advanced silicon solar cells: fundamentals and manufacturing issues" – Presented at the Indian Institute of Technology, Mumbai, India, December 18, 2017.
8. "Advanced silicon solar cells: Interdigitated back contact (IBC) and heterojunctions" – Presented at the University of Virginia, October 13, 2017.
9. "Sulfur assisted Si defect passivation by H₂S reaction" – Presented at Air Liquide Delaware research and technology center, June 19, 2017.
10. "Close space sublimation process for perovskite absorber" – Presented at the Quantum Energy and Sustainable Solar Technologies (QESST) workshop, Arizona State University, May 7, 2018.

11. "Emergent role of surface and interfaces in Si solar cells" – Presented at the Department of Electrical and Computer Engineering, University of Delaware, April, 2019.
12. "Removal of surface and interface defects for high efficiency Si solar cell" – Presented at the Department of Materials Science and Engineering, University of Delaware, May, 2019.

SYNERGISTIC ACTIVITIES

- Peer-Reviewer of US DOE Solar Energy Technologies Office (SETO) – 9 projects on 5 different technologies
- Area 4 co-Chair in 52nd IEEE PVSC conference, 2024.
- Session Chair in 50th IEEE PVSC conference, 2023.
- Sub-area Chair in 49th IEEE PVSC conference, 2022.
- Session Chair in 34th IEEE PVSC conference, 2009.
- Served as consultant to 3 US PV companies and 1 Indian thin film equipment manufacturer.
- Member of IEEE Electron Devices Society.
- Lifetime member of Indian Association for the Cultivation of Science.
- Regular reviewer of scientific journals (IEEE EDS, AIP, APS, Wiley, AVS, and Elsevier).

PATENTS

- "Processes for fabricating all-back-contact heterojunction photovoltaic cells" Robert Birkmire, Steven Hegedus, Ujjwal Das. US Patent 8,450,141 B2, awarded May 2013.
- "Method of silicon surface passivation by chalcogen elements for photovoltaic application" Ujjwal K Das and Ajeet Rohatgi. Provisional application filed in May, 2019.

PUBLICATIONS

1. "Control of microstructure and optoelectronic properties of Si:H films by argon dilution in PECVD from silane", P. Chaudhuri and U. K. Das, Jpn. J. Appl. Phys. **34**, 3467 (1995).
2. "Reduced light induced degradation in a-Si:H solar cells with i-layers deposited by glow discharge decomposition of silane-argon mixture", J. K. Rath, U. K. Das and P. Chaudhuri, Proc. of 13th European Photovoltaic Solar Energy Conference, (23-27 October, Nice, France, 1995) p.280.

3. "Effect of argon dilution on the structure of microcrystalline silicon deposited from silane," U. K. Das, P. Chaudhuri and S. T. Kshirsagar, *J. Appl. Phys.* **80**, 5389 (1996).
4. "Some new properties of microcrystalline silicon grown by argon assisted plasma enhanced chemical vapour deposition", P. Chaudhuri, U. K. Das, S. T. Kshirsagar and C. Longeaud, *Proc. of the 17th International Conference on Amorphous and Microcrystalline Semiconductors held at Budapest, Hungary* (1997), p.247.
5. "Argon assisted plasma CVD of amorphous silicon carbide films," P. Chaudhuri and U. K. Das, *Jpn. J Appl. Phys.* **36**, L1426, (1997).
6. "Enhanced boron doping in amorphous and microcrystalline silicon by Ar dilution", U. K. Das, T. K. Bhattacharyya and P. Chaudhuri, *J. Phys. D : Appl. Phys.*, vol. **30**, 3371, (1997).
7. "Optical emission spectroscopic study of a radio frequency plasma of Ar+SiH₄", U. K. Das and P. Chaudhuri, *Chem. Phys. Lett.* **298**, 211 (1998).
8. "Nanostructures and Defects in silicon hydrogen alloys prepared by argon dilution", U. K. Das, A. R. Middy, J. K. Rath, C. Longeaud, D. L. Williamson and P. Chaudhuri, *J. Non-Cryst. Solids* **276**, 46 (2000).
9. "Correlation of nanostructural heterogeneity and light induced degradation in amorphous silicon solar cells", U. K. Das, J. K. Rath, D. L. Williamson and P. Chaudhuri, *Jpn. J. Appl. Phys.* **39**, 2530 (2000).
10. "Creation and annihilation mechanism of dangling bonds of a-Si:H growth surface studied by in-situ ESR technique", S. Yamasaki, U. K. Das, T. Umeda, J. Isoya and K. Tanaka, *J. Non-Cryst. Solids* **266-269**, 529 (2000).
11. "Fast in-diffusion of hydrogen at the initial stage of hydrogen plasma treatment on a-Si:H films observed by in-situ ESR measurements", U. K. Das, T. Yasuda and S. Yamasaki: *Mat. Res. Soc. Symp. Proc.* Vol. **609**, A26.5 (2000).
12. "Fast diffusion of H and creation of dangling bonds in hydrogenated amorphous silicon studied by *in-situ* ESR," U. K. Das, T. Yasuda and S. Yamasaki, *Phys. Rev. Lett.* **85**, 2324 (2000).
13. "*In-Situ* ESR study to detect the diffusion of free H and creation of dangling bonds in hydrogenated amorphous silicon", U. K. Das, T. Yasuda and S. Yamasaki, *Phys. Rev. B*, **63**, 245204 (2001).
14. "Deposition of microcrystalline silicon materials and solar cells via the pulsed PECVD technique", Ujjwal K. Das, Scott Morrison, and Arun Madan, *J. Non-Cryst. Solids* **299-302**, 79 (2002).
15. "Fast hydrogen diffusion in hydrogenated amorphous silicon observed by in-situ ESR", S. Yamasaki, U. K. Das and T. Yasuda, *J. Non-Cryst. Solids* **299-302**, 185 (2002).
16. "Direct observation of surface dangling bonds during plasma process: chemical reactions during H and Ar plasma treatments", Satoshi Yamasaki, Ujjwal K. Das, Kenji Ishikawa, *Thin Solid Films* **407**, 139 (2002).

17. "Amorphous and microcrystalline silicon solar cells grown by pulsed PECVD technique", Ujjwal K. Das, Scott Morrison, and Arun Madan, *Mat. Res. Soc. Symp. Proc.* Vol. **715**, A26.6 (2002).
18. "Study of amorphous to microcrystalline silicon transition from argon diluted silane", N. Dutta Gupta, P. P. Ray, P. Chaudhuri, U. K. Das, S. Vignoli and C. Jardin, *Mat. Res. Soc. Symp. Proc.* Vol. **715**, A20.7 (2002).
19. "Deposition of thin film silicon using the pulsed PECVD and HWCVD techniques," S. Morrison, Ujjwal Das, and Arun Madan, *Solar Energy Materials and Solar Cells* **76**, 281 (2003).
20. "Thin film silicon materials and solar cells grown by Pulsed PECVD technique," Ujjwal Das, S. Morrison, E. Centurioni and Arun Madan, *IEE proceedings CDS special issue on Amorphous and Microcrystalline Devices* edited by S. O. Kasap and Harry Colson v. **150**, 282 (2003).
21. "Dominant effect of p/i interface on dark J-V characteristics in p-i-n nano-crystalline Si solar cells", U. Das, A. Bozsa and A. Madan, *Mat. Res. Soc. Symp. Proc.* Vol. **808**, A9.45.1 (2004).
22. "Bottom-Gate TFTs with Channel Layer Grown by Pulsed PECVD Technique", David J. Grant, Czung-Ho Lee, Arokia Nathan, Ujjwal K. Das and Arun Madan, *Mat. Res. Soc. Symp. Proc.* Vol. **808**, A4.8.1 (2004).
23. "Large Area (30 cm x 40 cm) Nano-crystalline Si Materials and Solar Cells Using the Pulsed PECVD Technique," A. Madan, U. Das, J. Hu and D. Zhong, *Proc. 19th European Photovoltaic Solar Energy Conference and Exhibition*, 1403 (2004).
24. "Effect of process parameter variation in deposited emitter and buffer layers on the performance of silicon heterojunctions solar cells," Ujjwal Das, Stuart Bowden, Michael Burrows, Steven Hegedus and Robert Birkmire, *Proc. 32nd IEEE PVSC and WCPEC-4*, 1283 (2006).
25. "Carrier lifetime as a developmental and diagnostic tool in silicon heterojunctions cells," S. Bowden, U. K. Das, S. S. Hegedus and R. W. Birkmire, *Proc. 32nd IEEE PVSC and WCPEC-4*, 1295 (2006).
26. "Interdigitated back contact silicon heterojunction solar cell and the effect of front surface passivation," Meijun Lu, Stuart Bowden, Ujjwal Das, Robert Birkmire, *Appl. Phys. Lett.* **91**, 063407 (2007). URL: <http://link.aip.org/link/?APL/91/063507>
27. "Hydrofluoric Acid Treatment of Amorphous Silicon Films for Photovoltaic Processing," M. Burrows, U. Das, M. Lu, S. Bowden, R. Opila, and R. Birkmire, *Mater. Res. Soc. Symp. Proc.* **989**, 0989-A18-06 (2007).
28. "Interdigitated Back Contact Silicon Heterojunction (IBC-SHJ) Solar Cell," Meijun Lu, Stuart Bowden, Ujjwal Das, Michael Burrows, and Robert Birkmire, *Mater. Res. Soc. Symp. Proc.* **989**, 0989-A24-05 (2007).
29. "Surface Passivation Quality and Structure of Thin Si:H Layers on N-type Crystalline Si (100) and (111) Wafers, U.K. Das, M. Burrows, M. Lu, S. Bowden, and R.W. Birkmire, *Proc. 22nd Euro. PVSEC*, pp.1290 (2007).

30. "a-Si/c-Si Heterojunction for Interdigitated Back Contact Solar Cell," M. Lu, U. Das, S. Bowden, R. Birkmire, Proc. 22nd Euro PVSEC, pp.924 (2007).
31. "Texturing for Heterojunction Silicon Solar Cells," M. Edwards, S. Bowden, and U. K. Das, Proc. 22nd Euro PVSEC, pp.940 (2007).
32. "Evolution of HF treated amorphous silicon for photoemission determined electronic levels," M. Burrows, R. Opila, K. Demircan, M. Lu, U. Das, S. Bowden, and R. Birkmire, Proc. 22nd Euro PVSEC, pp.1726 (2007).
33. "Surface Passivation and Heterojunction Cells on Si (100) and (111) Wafers Using dc and rf Plasma Deposited Si:H Thin Films," U.K. Das, M.Z. Burrows, M. Lu, S. Bowden and R.W. Birkmire, Appl. Phys. Lett. 92, 063504 (2008). <http://link.aip.org/link/?APL/92/063504>
34. "Role of hydrogen bonding environment in a-Si:H films for c-Si Surface Passivation," M.Z. Burrows, U.K. Das, R.L. Opila, S.DeWolf, R.W. Birkmire, J. Vac. Sci. Technol. A26(4), 683 (2008).
35. "Improved Passivation of a-Si:H/c-Si Interfaces Through Film Restructuring," M.Z. Burrows, U.K. Das, S. Bowden, S.S. Hegedus, R.L. Opila, and R.W. Birkmire, Mater. Res. Soc. Symp. Proc. 1066, 1066-A02-05 (2008).
36. "Effect of Texturing and Surface Preparation on Lifetime and Cell Performance in Heterojunction Silicon Solar Cells," Matthew Edwards, Stuart Bowden, Ujjwal Das and Michael Burrows, Solar Energy Mat. & Solar Cells 92, 1373 (2008).
37. "Stability of Amorphous-Crystalline Silicon Heterojunctions," Stuart Bowden, Ujjwal Das, Robert Birmire, Proc. 33rd IEEE PVSC, (2008).
38. "Rear Surface Passivation of Interdigitated Back Contact Silicon Heterojunction Solar Cell and 2D Simulation Study," Meijun Lu, Ujjwal Das, Stuart Bowden, Robert Birkmire, Proc. 33rd IEEE PVSC, (2008).
39. Progress Towards High Efficiency All Back Contact c-Si Heterojunction Solar Cells," U. Das, S. Bowden, M. Lu, M. Burrows, D. Xu, O. Jani, S. Hegedus, R. Birkmire, 18th Workshop on Crystalline Silicon Solar Cells, 70 (2008).
40. "Optimization of Interdigitated Parameters for Back Contact Si Heterojunction Solar Cells," O. Jani, U. Das, S. Herasinenka, M. Lu, D. Xu, S. Bowden, S. Hegedus, R. Birkmire, PVSEC18, (2009).
41. "Designing Rear Surface for Carrier Transport in Back Contact Si Heterojunction Solar Cells," U. Das, M. Lu, D. Xu, O. Jani, S. Bowden, S. Hegedus, R. Birkmire, PVSEC18, (2009).
42. "Optimization of Interdigitated Back Contact Silicon Heterojunction Solar Cells by Two-dimensional Numerical Simulation," Meijun Lu, Ujjwal Das, Stuart Bowden, Steven Hegedus and Robert Birkmire, Proc. 34th IEEE PVSC, Philadelphia, PA, June 8-12, pp.1475 (2009).
43. "Low Temperature Front Surface Passivation of Interdigitated Back Contact Silicon Heterojunction Solar Cell," Brent Shu, Ujjwal Das, Omkar Jani, Steven

- Hegedus, and Robert Birkmire, Proc. 34th IEEE PVSC, Philadelphia, PA, June 8-12, pp.1316 (2009).
44. "Alternative Approaches for Low Temperature Front Surface Passivation of Interdigitated Back Contact Silicon Heterojunction Solar Cell," Brent Shu, Ujjwal Das, Jesse Appel, Brian McCandless, Steven Hegedus and Robert Birkmire, Proc. 35th IEEE PVSC, Waikiki, Hawaii, June 21-25, pp.3223 (2010).
 45. "Investigation of Hetero-interface and Junction Properties in Silicon Heterojunction Solar Cells," Ujjwal Das, Steven Hegedus, Lulu Zhang, Jesse Appel, Jim Rand, and Robert Birkmire, Proc. 35th IEEE PVSC, Waikiki, Hawaii, June 21-25, pp.1358 (2010).
 46. "Effect of Junction Interface Modification of Silicon Heterojunction Solar Cells," Jesse Appel, Lulu Zhang, Ujjwal Das, Steven Hegedus, Swapna Mudigonda, Robert Birkmire, Jim Rand, Proc. 35th IEEE PVSC, Waikiki, Hawaii, June 21-25, pp.1295 (2010).
 47. "Optimization of Interdigitated Back Contact Silicon Heterojunction Solar Cells: Tailoring Hetero-interface band Structures While Maintaining Surface Passivation", Meijun Lu, Ujjwal Das, Stuart Bowden, Steven Hegedus and Robert Birkmire, Prog. Photovolt.: Res. Appl. 19, 326 (2011). DOI: 10.1002/pip. 1032 (2010).
 48. "Properties of amorphous silicon passivation layers for all back contact c-Si heterojunction solar cells", L. Zhang, U. Das, J. Appel, S. Hegedus, and R. Birkmire, Mater. Res. Soc. Symp. Proc. 1321, 93 (2011). DOI:10.1557/opl.2011.942.
 49. "Interdigitated back contact silicon hetero-junction solar cells: The effect of doped layer defect levels and rear surface i-layer band gap on fill factor using two-dimensional simulations", J. Allen, B. Shu, L. Zhang, U. Das, and S. Hegedus, Proc. 37th IEEE PVSC, Seattle, WA, pp.2545 (2011).
 50. "Improved FF in p-Si heterojunction solar cells due to optimized ITO/emitter contact", Z. D. Eygi, U. Das, S. Hegedus, and R. Birkmire Proc. 37th IEEE PVSC, Seattle, WA, pp.1424 (2011).
 51. "Effect of Si₂H₆ as a gas phase additive to increase growth rate of a-Si:H films and solar cells", L. Zhu, U. K. Das, C. Das, and S. Hegedus, Mater. Res. Soc. Symp. Proc. 1426, 415 (2012). DOI:10.1557/opl.2012.1181.
 52. "Impact of back surface patterning process on FF in IBC-SHJ", L. Zhang, B. Shu, R. Birkmire, S. Hegedus, and U. Das, Proc. 38th IEEE PVSC, Austin, TX, pp.1177 (2012).
 53. "Characterization and modeling of low temperature surface passivation for interdigitated back contact silicon hetero-junction solar cell", B. Shu, U. Das, S. Hegedus, and R. Birkmire, Proc. 38th IEEE PVSC, Austin, TX, pp.1105 (2012).
 54. "Design of anti-reflection coating for surface textured interdigitated back contact silicon hetero-junction solar cell", B. Shu, U. Das, L. Chen, L. Zhang, S. Hegedus, and R. Birkmire, Proc. 38th IEEE PVSC, Austin, TX, pp.2258 (2012).

55. "A low cost kerfless thin crystalline Si solar cell technology", R. A. Rao, L. Mathew, D. Sarkar, S. Smith, S. Saha, R. Garcia, R. Stout, A. Gurmu, M. Ainom, E. Onyegam, D. Xu, D. Jawarani, J. Fossum, S. Banerjee, U. Das, A. Upadhyaya, A. Rohatgi, and Q. Wang, Proc. 38th IEEE PVSC, Austin, TX, pp.1837 (2012).
56. "Optimizing emitter-buffer layer stack thickness for p-type silicon heterojunction solar cells", Z. D. Eygi, U. Das, S. Hegedus and R. Birkmire, J. Renewable Sustainable Energy 5, 013117 (2013). DOI: 10.1063/1.4792510.
57. "Single heterojunction solar cells on exfoliated flexible ~25 μm thick monocrystalline silicon substrates", S. Saha, M. M. Hilali, E. U. Onyegam, D. Sarkar, D. Jawarani, R. A. Rao, L. Mathew, R. S. Smith, D. Xu, U. K. Das, B. Sopori and S. Banerjee, Appl. Phys. Lett. 102, 163904 (2013). DOI: 10.1063/1.4803174.
58. "Experimental and simulated analysis of front versus all-back-contact silicon heterojunction solar cells: Effect of interface and doped a-Si:H layer defects," Zhan Shu, Ujjwal Das, John Allen, Robert Birkmire and Steven Hegedus, Prog. Photovolt.: Res. Appl. 23, 78 (2015). DOI: 10.1002/pip2400.
59. "Laser Textured Heterojunction Solar Cells on 45 μm Thick Si wafers: Effect of Optical Configuration and Light Trapping", Steven Hegedus, Ujjwal Das, Chris Vineis, Moran Levy-Finklshtein, Jason Sickler and Jim Carey, Proc. 39th IEEE PVSC, Tampa, FL, pp.1238 (2013).
60. "Sensitivity of Surface Passivation and Interface Quality in IBC-SHJ Solar Cells to Patterning Process", Ujjwal Das, Jianbo He, Zhan Shu, Lulu Zhang, Chris Thompson, Robert Birkmire and Steven Hegedus, Proc. 39th IEEE PVSC, Tampa, FL, pp.1224 (2013).
61. "Laser fired contact for n-type crystalline silicon solar cell", Jianbo He, Steven Hegedus, Ujjwal Das, Zhan Shu, Murray Bennett and Robert Birkmire, Proc. 39th IEEE PVSC, Tampa, FL, pp.2201 (2013).
62. "Effect of RF or VHF Plasma on Nanocrystalline Silicon Thin Film Structure: Insight from OES and Langmuir Probe Measurements", Lala Zhu, Ujjwal K Das, Steven S Hegedus and Robert W Birkmire, Mater. Res. Soc. Symp. Proc. 1536, 161 (2013). DOI:10.1557/opl.2013.924.
63. "Laser fired contact for n-type crystalline silicon solar cell", Jianbo He, Steven Hegedus, Ujjwal Das, Zhan Shu, Murray Bennett, Lei Zhang and Robert Birkmire, Prog. Photovolt.: Res. Appl. 23, 1091 (2015). DOI: 10.1002/pip2520.
64. "The role of back contact patterning on stability and performance of Si IBC heterojunction solar cells", Ujjwal K. Das, Hsiang-Yu Liu, Jianbo He and Steven Hegedus, Proc. 40th IEEE PVSC, Denver, CO, pp.590 (2014).
65. "Experimental and simulated analysis of p a-Si:H defects on silicon heterojunction solar cells: trade-offs between V_{OC} and FF", L. Zhang, U. K. Das, Z. Shu, H. Liu, R. W. Birkmire and S. S. Hegedus, Proc. 42nd IEEE PVSC, New Orleans, LA, (2015).
66. "Comparing interface defect density vs materials interface charge for gap passivation of inter-digitated back contact silicon heterojunction solar cells", L.

- Zhang, U. Das, R. Birkmire and S. Hegedus, Presented at the 58th MRS electronic materials conference, Newark, DE, (2016).
67. "Silicon surface passivation by H₂S reaction for c-Si solar cell", H. Liu, U. Das, S. Hegedus, Z. E. Voras, T. P. Beebe, and R. Birkmire, Presented at the 58th MRS electronic materials conference, Newark, DE, (2016).
 68. "Surface defect passivation and reaction of c-Si in H₂S", H. Liu, U. K. Das, and R. W. Birkmire, *Langmuir* 33, 14580 (2017). DOI: [10.1021/acs.langmuir.7b03520](https://doi.org/10.1021/acs.langmuir.7b03520).
 69. "A novel defect passivation method for multicrystalline Si wafer by H₂S reaction", H. Liu, U. K. Das, and R. W. Birkmire, *Proc. 44th IEEE PVSC*, Washington DC, pp.2637 (2017). DOI: [10.1109/PVSC.2017.8366054](https://doi.org/10.1109/PVSC.2017.8366054)
 70. "Hydrogen plasma post-deposition treatment for passivation of a-Si/c-Si interface for heterojunction solar cell by correlating optical emission spectroscopy and minority carrier lifetime", A. Soman, U. Nsofor, L. Zhang, U. Das, T. Gu, and S. Hegedus, *Proc. 44th IEEE PVSC*, Washington DC, pp.1828 (2017). DOI: [10.1109/PVSC.2017.8366194](https://doi.org/10.1109/PVSC.2017.8366194)
 71. "Gap passivation structure for scalable n-type interdigitated all back contact silicon hetero-junction solar cell", L. Zhang, U. Das, and S. Hegedus, *Proc. 44th IEEE PVSC*, Washington DC, pp.408 (2017). DOI: [10.1109/JPHOTOV.2017.2783852](https://doi.org/10.1109/JPHOTOV.2017.2783852)
 72. "Electroluminescence analysis for separation of series resistance from recombination effects in silicon solar cells with interdigitated back contact design", N. Ahmed, L. Zhang, U. Das, and S. Hegedus, *Proc. 44th IEEE PVSC*, Washington DC, pp.2667 (2017). DOI: [10.1109/PVSC.2017.8366363](https://doi.org/10.1109/PVSC.2017.8366363)
 73. "Processing approaches and challenges of interdigitated back contact Si solar cells", U. Das, L. Zhang, and S. Hegedus, *Proc. 44th IEEE PVSC*, Washington DC, pp.1761 (2017). DOI: [10.1109/PVSC.2017.8366709](https://doi.org/10.1109/PVSC.2017.8366709)
 74. "Effect of dielectric layers on laser-fired-contact performance in a-Si/c-Si heterojunction solar cells", U. Das, C. Thompson, U. Nsofor, Z. Sun, M. C. Gupta, and S. Hegedus, *Proc. of WCPEC-7*, Waikola, HI, pp.2114 (2018). DOI: [10.1109/PVSC.2018.8547322](https://doi.org/10.1109/PVSC.2018.8547322)
 75. "Improving the interface passivation of Si HJ solar cells by interrupted deposition of thin a-Si:H film", U. J. Nsofor, A. Soman, U. Das, and S. Hegedus, *Proc. of WCPEC-7*, Waikola, HI, pp.356 (2018). DOI: [10.1109/PVSC.2018.8547458](https://doi.org/10.1109/PVSC.2018.8547458)
 76. "Highly-integrated hybrid micro-concentrating photovoltaics", L. Li, D. Li, B. Jared, B. Miller, W. Sweatt, S. Paap, M. Saavedra, C. Alford, J. Mudrick, M. Wood, U. Das, S. Hegedus, A. Tauke-Pedretti, J. Hu, and T. Gu, *Proc. of WCPEC-7*, Waikola, HI, pp.1655 (2018). DOI: [10.1109/PVSC.2018.8547904](https://doi.org/10.1109/PVSC.2018.8547904)
 77. "Si surface passivation by sulfur and reduction of interface defect recombination", U. Das, S. Jafari, L. Zhang, H. Liu, R. Birkmire, and S. Hegedus, *Proc. of WCPEC-7*, Waikola, HI, pp.3076 (2018). DOI: [10.1109/PVSC.2018.8547951](https://doi.org/10.1109/PVSC.2018.8547951)

78. "Direct laser isolation for interdigitated back contact heterojunction solar cells", Z. Sun, U. Nsofor, N. Ahmed, U. Das, S. Hegedus, and M. C. Gupta, Proc. of WCPEC-7, Waikola, HI, pp.2074 (2018). DOI: [10.1109/PVSC.2018.8547964](https://doi.org/10.1109/PVSC.2018.8547964)
79. "Study of passivation in the gap region between contacts of interdigitated-back-contact Silicon heterojunction solar cell: simulation and voltage-modulated laser-beam-induced-current", L. Zhang, N. Ahmed, C. Thompson, U. Das, and S. Hegedus, IEEE J. Photovoltaics 8, 404 (2018). DOI: [10.1109/JPHOTOV.2017.2783852](https://doi.org/10.1109/JPHOTOV.2017.2783852).
80. "Electroluminescence analysis for spatial characterization of parasitic optical losses in silicon heterojunction solar cells", N. Ahmed, L. Zhang, G. Sriramagiri, U. Das, and S. Hegedus, J. Appl. Phys. 123, 143103 (2018). DOI: <https://doi.org/10.1063/1.5007048>.
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