

CURRICULUM VITAE

A/Professor Ashraf Uddin

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Academic Qualifications:

- B.Sc.(Hons.), Physics Honours (1st), 1980, Dhaka University, Bangladesh
- M.Sc. (Solid State Physics), 1st class, 1982, Dhaka University, Bangladesh
- Ph.D. (Semiconductor Physics), 1991, Osaka University, Osaka, Japan

Professional Qualifications/Memberships: (State date of membership)

- Senior Member, IEEE, USA 1999 - present
- Member, Jpn. Society of Appl. Phys., Japan 1991 – 1998
- Member, Jpn. Society of Physics, Japan 1988 – 1995
- Member, Materials Research Society, Singapore 2003 – 2008

Summary of Working Experience:

I obtained my PhD degree in March 1991 in Semiconductor Physics from the Osaka University, Osaka, Japan. Before moving to Japan I worked on MBE grown III-V semiconductor materials and devices in Chalmers University of Technology, Sweden for about two years and on silicon solar cell in Atomic Energy Research Center, Dhaka, Bangladesh. After my PhD I joined at the R&D center of Toshiba Corporation, Japan as semiconductor materials and devices research scientist (1991 – 1997). There I worked on opto-electronic devices for about three years and then I worked on poly-Si thin film transistor (TFT) to develop a process technology on glass substrate for the fabrication of flat panel display (LCD type). In 1997 I migrated to Australia from Japan and worked on III-V semiconductor laser diodes in the Australian National University, Canberra. I worked at the School of Materials Science and Engineering (MSE), Nanyang Technological University (NTU), Singapore as an Assistant Professor from 1 July 2001 to 30 June 2007. Then I worked in the Department of Electrical and Computer Engineering, King Abdulaziz University, Jeddah, Saudi Arabia as an Associate Professor from August 2007 to December 2008. Now I am working in the School of Photovoltaic and Renewable Energy Engineering, the University of New South Wales (UNSW) as an Associate Professor. I have published over 180 research papers in different international

journals and in conference proceedings. I have 17 patents. **Toshiba Corporation, Japan is using two of my patents (Jpn. Patent 1995-94773, US Patent 5,581,087) for their commercial products.**

Publication List:

Book Chapters: 4

Number of journal papers: 114 + 12 (under review); Total = 126

Number of conference papers: 96 + 30(not listed)

Number of patents: 17

Total Citation of papers: 2530

h-index: 22 according to Scopus

(a) Book Chapters:

4. **Ashraf Uddin**, Chapter 9, “Perovskite Solar Cells”, World Scientific Handbook of Organic Optoelectronic Devices, Volume 1, Jinsong Huang, et al. (Eds), publisher World Scientific, (2017) p285 – 368. [ISBN:
3. **Ashraf Uddin** and Martin A. Green, “Donor-Acceptor Interface and Conversion Efficiency”, “Advances in Materials Science Research; Volume 16, Edited by Maryann C. Wythers, published by Nova Science Publishers, Inc. Hauppauge, NY, (2013) P 149-174. [ISBN: 978-1-62618-302-5]
2. **Ashraf Uddin**, Chapter 5 “Photovoltaic Devices” “Handbook of Research on Solar Energy Systems and Nanotechnology”, Edited by Dr. Sohail Anwar, Dr. Salahuddin Qazi, and Dr. Harry Efstathiadis, published by IGI Global publisher, USA (2013) P126 - 162. [ISBN13: 978-1-46661-996-8]
1. **Ashraf Uddin**, Chapter 1 “Doping of Organic Electronic Materials” “Doping: Properties, Mechanism and Applications”, Edited by Dr Lixin Yu, published by Nova Science Publishers, Inc. Hauppauge, NY (2013) P1 - 50. [ISBN-13: 978-1-62618-105-2]

(b) Journal Papers:

114. Ashraf Uddin, Md Arafat Mahmud, Naveen Kumar Elumalai, Mushfika Baishakhi Upama, Dian Wang, Faiazul Haque, Cheng Xu, “Low Temperature Processed Efficient and Stable Perovskite Solar Cell, Adv. Mater. Lett. (in press).
113. MA Mahmud, NK Elumalai, MB Upama, D Wang, VR Gonçalves, M Wright, A Uddin, “Cesium compounds as interface modifiers for stable and efficient perovskite solar cells”, Solar Energy Materials and Solar Cells 174 (2018) 172-186.
112. D Wang, NK Elumalai, MA Mahmud, M Wright, MB Upama, KH Chan, A Uddin, “V₂O₅-PEDOT: PSS bilayer as hole transport layer for highly efficient and stable perovskite solar cells”, Organic Electronics 53 (2018) 66-73.
111. Cheng Xu, Matthew Wright, Duanlei Ping, Haimang Yi, Xueyun Zhang, MD Arafat Mahmud, Kaiwen Sun, Mushfika Upama, Faiazul Haque, Ashraf Uddin, “Ternary blend organic solar cells with a non-fullerene acceptor as a third component to synergistically improve the efficiency”, Organic Electronics 62 (2018) 261–268.
110. Cheng Xu, Matthew Wright, Naveen Kumar Elumalai, Md Arafat Mahmud, Vinicius R Gonçalves, Mushfika B Upama, Ashraf Uddin, “Optimization of conjugated polymer blend concentration for high performance organic solar cells”, Journal of Materials Science: Materials in Electronics <https://doi.org/10.1007/s10854-018-9735-3>.
109. F Haque, NK Elumalai, M Wright, MA Mahmud, D Wang, MB Upama, C Xu, A Uddin, “Annealing induced microstructure engineering of antimony tri-selenide thin films”, Materials Research Bulletin 99 (2018) 232-238
108. Cheng Xu, Matthew Wright, Naveen Kumar Elumalai, Md Arafat Mahmud, Dian Wang, Vinicius R Gonçalves, Mushfika Baishakhi Upama, Faiazul Haque, J Justin Gooding, Ashraf Uddin, “Realizing 11.3% efficiency in PffBT4T-2OD fullerene organic solar cells via superior charge extraction at interfaces”, Applied Physics A 124 (2018) p449. [IF: 5.2; Citations: 1]
107. Zinab H Bakr, Qamar Wali, Jamil Ismail, Naveen Kumar Elumalai, Ashraf Uddin, Rajan Jose, “Data of chemical analysis and electrical properties of SnO₂-TiO₂ composite nanofibers”, Data in Brief 18 (2018) p860 – 863. [IF: 5.2; Citations: 1]
106. Cheng Xu, Matthew Wright, Naveen Kumar Elumalai, Md Arafat Mahmud, Dian Wang, Mushfika Baishakhi Upama, Faiazul Haque, **Ashraf Uddin**, “Highly crystalline bilayer electron transport layer for efficient conjugated polymer solar cells”, Current Applied Physics 18 (2018) p505 – 511. [IF: 5.2; Citations: 1]
105. M.A. Mahmud, N.K. Elumalai, M.B. Upama, D. Wang, V.R. Goncales, M. Wright,

- C. Xu, F. Haque, **A. Uddin**, "Passivation of Interstitial and Vacancy Mediated Trap-states for Efficient and Stable Triple-Cation Perovskite Solar Cells," *Journal of Power Sources* 383 (2018) p59 - 71. [IF: 5.2; Citations: 1]
104. Zinab H. Bakr, Qamar Wali, Jamil Ismail, Naveen Kumar Elumalai, **Ashraf Uddin**, Rajan Jose, "Synergistic combination of electronic and electrical properties of SnO₂ and TiO₂ in a single SnO₂-TiO₂ composite nanofiber for dye-sensitized solar cells", *Electrochimica Acta* 263 (2018) p524 – 532.
 103. Qamar Wali, Naveen Kumar Elumalai, Yaseen Iqbal, **Ashraf Uddin**, Rajan Jose, "Tandem perovskite solar cells", *Renewable and Sustainable Energy Reviews* 84 (2018) p89–110. [IF: 5.2; Citations: 1]
 102. Mushfika Baishakhi Upama, Naveen Kumar Elumalai, Md Arafat Mahmud, Matthew Wright, Dian Wang, Cheng Xu, **Ashraf Uddin**, "Effect of annealing dependent blend morphology and dielectric properties on the performance and stability of non-fullerene organic solar cells", *Solar Energy Materials and Solar Cells* 176 (2018) p109-118. [IF: 4.8]
 101. Md Arafat Mahmud, Naveen Kumar Elumalai, Mushfika Baishakhi Upama, Dian Wang, Leila Zarei, Vinicius R. Gonçalves, Matthew Wright, Cheng Xu, Faiazul Haque and **Ashraf Uddin**, "Adsorbed carbon nanomaterials for surface and interface-engineered stable rubidium multi-cation perovskite solar cells", *Nanoscale* 10 (2018) p773. [IF: 7.4]
 100. Dian Wang, Naveen Kumar Elumalai, Md Arafat Mahmud, Matthew Wright, Mushfika Baishakhi Upama, Kah Howe Chan, Cheng Xu, Faiazul Haque, Gavin Conibeer, **Ashraf Uddin**, "V₂O₅-PEDOT: PSS bilayer as hole transport layer for highly efficient and stable perovskite solar cells", *Organic Electronics* 53 (2017) p66-73. [IF: 3.4]
 99. Md Arafat Mahmud, Naveen Kumar Elumalai, Mushfika Baishakhi Upama, Dian Wang, Vinicius R Gonçalves, Matthew Wright, John Justin Gooding, Faiazul Haque, Cheng Xu, **Ashraf Uddin**, "Cesium compounds as interface modifiers for stable and efficient perovskite solar cells", *Solar Energy Materials and Solar Cells* 174 (2017) p172-186. [IF: 5.2; Citations: 1]
 98. Faiazul Haque, Naveen Kumar Elumalai, Matthew Wright, Md Arafat Mahmud, Dian Wang, Mushfika Baishakhi Upama, Cheng Xu, **Ashraf Uddin**, "Annealing Induced Microstructure Engineering of Antimony Tri-selenide Thin Films", *Materials Research Bulletin* 99 (2017) p232 – 238. [IF: 5.2; Citations: 1]
 97. Mushfika Baishakhi Upama, Naveen Kumar Elumalai, Md Arafat Mahmud, Dian Wang, Faiazul Haque, Vinicius R Gonçalves, J Justin Gooding, Matthew Wright, Cheng Xu, **Ashraf Uddin**, "Role of fullerene electron transport layer on the

morphology and optoelectronic properties of perovskite solar cells” Organic Electronics 50 (2017) p279-289. [IF: 5.2; Citations: 1]

96. Md Arafat Mahmud, Naveen Kumar Elumalai, Mushfika Baishakhi Upama, Dian Wang, Arman Mahboubi Soufiani, Matthew Wright, Cheng Xu, Faiazul Haque, **Ashraf Uddin**, “Solution-Processed Lithium-Doped ZnO Electron Transport Layer for Efficient Triple Cation (Rb, MA, FA) Perovskite Solar Cells”, ACS applied materials & interfaces 9 (2017) p33841-33854. [IF: 5.2; Citations: 1]
95. Mushfika Baishakhi Upama, Naveen Kumar Elumalai, Md Arafat Mahmud, Matthew Wright, Dian Wang, Cheng Xu, Faiazul Haque, Kah Howe Chan, **Ashraf Uddin**, “Interfacial engineering of electron transport layer using Caesium Iodide for efficient and stable organic solar cells”, Applied Surface Science 416 (2017) p834-844. [IF: 5.2; Citations: 1]
94. Mushfika Baishakhi Upama, Matthew Wright, Naveen Kumar Elumalai, Md Arafat Mahmud, Dian Wang, Cheng Xu, **Ashraf Uddin**, “High-Efficiency Semitransparent Organic Solar Cells with Non-Fullerene Acceptor for Window Application”, ACS Photonics 4 (2017) p2327-2334. [IF: 5.2; Citations: 1]
93. Md Arafat Mahmud, Naveen Kumar Elumalai, Mushfika Baishakhi Upama, Dian Wang, Faiazul Haque, Matthew Wright, Cheng Xu, **Ashraf Uddin**, “Controlled nucleation assisted restricted volume solvent annealing for stable perovskite solar cells”, Solar Energy Materials and Solar Cells 167 (2017) p70-86. [IF: 5.2; Citations: 1]
92. Md Arafat Mahmud, Naveen Kumar Elumalai, Mushfika Baishakhi Upama, Dian Wang, Binesh Puthen-Veettil, Faiazul Haque, Matthew Wright, Cheng Xu, Almantas Pivrikas, **Ashraf Uddin**, “Controlled Ostwald ripening mediated grain growth for smooth perovskite morphology and enhanced device performance”, Solar Energy Materials and Solar Cells 167 (2017) p87-101. [IF: 5.2; Citations: 1]
91. Mushfika Baishakhi Upama, Naveen Elumalai, Md Arafat Mahmud, Heng Sun, Dian Wang, Kah Howe Chan, Matthew Wright, Cheng Xu, **Ashraf Uddin**, “Organic solar cells with near 100% efficiency retention after initial burn-in loss and photo-degradation”, Thin Solid Films 636 (2017) p127 – 136. [IF: 5.2; Citations: 1]
90. Luting Yan, Kah Howe Chan, **Ashraf Uddin**, “Dopamine-induced growth of Au and Ag nanoparticles on ITO substrate and their application in PCPDTBT-based polymer solar cell”, Plasmonics 12 (2017) p345-351. [IF: 5.2; Citations: 1]
89. Md Arafat Mahmud, Naveen Kumar Elumalai, Mushfika Baishakhi Upama, Dian Wang, Kah Howe Chan, Matthew Wright, Cheng Xu, Faiazul Haque, **Ashraf Uddin**, “Low temperature processed ZnO thin film as electron transport layer for

- efficient perovskite solar cells”, *Solar Energy Materials and Solar Cells* 159 (2017) p251-264. [IF: 5.2; Citations: 1]
88. Mushfika Baishakhi Upama, Matthew Wright, Md Arafat Mahmud, Naveen Kumar Elumalai, Arman Mahboubi Soufiani, Dian Wang, Cheng Xu, **Ashraf Uddin**, “Photo-degradation of high efficiency fullerene-free polymer solar cell”, *Nanoscale* 9 (2017) p18788-18797. [IF: 5.2; Citations: 1]
 87. Dian Wang, Kah H Chan, Naveen Kumar Elumalai, Md Arafat Mahmud, Mushfika B Upama, **Ashraf Uddin**, Supriya Pillai, “Interfacial engineering of hole transport layers with metal and dielectric nanoparticles for efficient perovskite solar cells”, *Physical Chemistry Chemical Physics* 19 (2017) p25016-25024. [IF: 5.2; Citations: 1]
 86. **Ashraf Uddin**, Md Arafat Mahmud, Naveen Kumar Elumalai, Dian Wang, Mushfika Baishakhi Upama, Matthew Wright, Kah Howe Chan, Faiazul Haque, Cheng Xu, “Perovskite solar cells for roll-to-roll fabrication”, *Renewable Energy and Environmental Sustainability* 2 (2017) p5. [IF: 5.2; Citations: 1]; <https://doi.org/10.1051/rees/2017019>
 85. Md Arafat Mahmud, Naveen Kumar Elumalai, Mushfika Baishakhi Upama, Dian Wang, Vinicius R Gonales, Matthew Wright, Cheng Xu, Faiazul Haque, **Ashraf Uddin**, “A high performance and low-cost hole transporting layer for efficient and stable perovskite solar cells”, *Phys. Chem. Chem. Phys.* 19 (2017) p21033-21045. [IF: 5.2; Citations: 1]
 84. Kateryna Bazaka, Jakaria Ahmad, Michael Oelgemller, **Ashraf Uddin**, Mohan V Jacob, “Photostability of plasma polymerized γ -terpinene thin films for encapsulation of OPV”, *Sci Rep.* 7 (2017) p45599. doi: 10.1038/srep45599; [IF: 5.2; Citations: 1]
 83. Mushfika Baishakhi Upama, Matthew Wright, Naveen Kumar Elumalai, Md Arafat Mahmud, Dian Wang, Kah Howe Chan, Cheng Xu, Faiazul Haque, **Ashraf Uddin**, “High performance semitransparent organic solar cells with 5% PCE using non-patterned MoO₃/Ag/MoO₃ anode”, *Current Applied Physics* 17 (2) (2017) p298-305. [IF: 2.2; Citations:]
 82. Kah H Chan, Naveen K Elumalai, Murad JY Tayebjee, **Ashraf Uddin**, Supriya Pillai, “Dark carrier dynamics and electrical characteristics of organic solar cells integrated with Ag-SiO₂ core-shell nanoparticles”, *Synthetic Metals* 223 (2017) p34-42. [IF: 1.8; Citations:]
 81. Mushfika Baishakhi Upama, Matthew Wright, Naveen Kumar Elumalai, Md Arafat Mahmud, Dian Wang, Kah Howe Chan, Cheng Xu, Faiazul Haque, **Ashraf Uddin**, “Optical modelling of P3HT: PC71BM semi-transparent organic solar cell”, *Optical and Quantum Electronics* 49 (1) (2017) p28. [IF: 1.3; Citations:]

80. Md Arafat Mahmud, Naveen Kumar Elumalai, Mushfika Baishakhi Upama, Dian Wang, Kah Howe Chan, Matthew Wright, Cheng Xu, **Ashraf Uddin**, “Low Temperature Processed ZnO Thin Film as Electron Transport Layer for Efficient Perovskite Solar Cells”, *Solar Energy Materials & Solar Cells* 159 (2017) p251–264. [IF: 4.7; Citations: 7].
79. Md Arafat Mahmud, Naveen Kumar Elumalai*, Mushfika Baishakhi Upama, Matthew Wright, Binesh Puthen Veetil, Dian Wang, Tian Sun, Kah Howe Chan, Cheng Xu, Faiazul Haque, and **Ashraf Uddin**, “Single vs Mixed Organic Cation for low temperature processed perovskite solar cells”, *Electrochimica Acta* 222 (2016) 1510–1521. [IF: 4.8; Citations: 3]
78. Md Arafat Mahmud, Naveen Kumar Elumalai*, Mushfika Baishakhi Upama, Dian Wang, Faiazul Haque, Matthew Wright, Kah Howe Chan, Cheng Xu, **Ashraf Uddin**, “Enhanced Stability of Low Temperature Processed Perovskite Solar Cells via Augmented Polaronic Intensity of Hole Transporting Layer” *Phys. Status Solidi RRL* 10 (2016) p882–889 (2016) / DOI 10.1002/pssr.201600315.[IF: 2.8; Citations: 2]
77. Chan K;Wright M;Elumalai N;**Uddin A**;Pillai S, 2016, 'Plasmonics in Organic and Perovskite Solar Cells: Optical and Electrical Effects', *Advanced Optical Materials*, <http://dx.doi.org/10.1002/adom.201600698> [IF: 5.2; Citations: 1]
76. Naveen Elumalai, Md Arafat Mahmud, Dian Wang and **Ashraf Uddin**, “Perovskite solar cells: progress and advancements”, *Energies* 9 (2016) p861. [IF: 2.1; Citations:]
75. Mushfika Baishakhi Upama, Matthew Wright, Binesh Puthen-Veetil, Naveen Kumar Elumalai, Md Arafat Mahmud, Dian Wang, Kah Howe Chan, Cheng Xu, Faiazul Haque, **Ashraf Uddin**, “Analysis of Burn-in Degradation in Organic Solar Cells using Photothermal Deflection Spectroscopy”, *RSC Advances* 6 (2016) p103899. [IF: 3.4; Citations: 2]
74. Md Arafat Mahmud, Naveen Kumar Elumalai, Mushfika Baishakhi Upama, Dian Wang, Matthew Wright, Kah Howe Chan, Cheng Xu, Faiazul Haque and **Ashraf Uddin**, “Simultaneous Enhancement in Stability and Efficiency of Low-Temperature Processed Perovskite Solar Cells”, *RSC Advances* 6 (2016) p86108–86125. [IF: 3.4; Citations:]
73. Naveen Elumalai and **Ashraf Uddin**, “Hysteresis in organic-inorganic hybrid perovskite solar cells”, *Solar Energy Materials & Solar Cells* 157 (2016) p476–509. [IF: 4.7; Citations: 12]

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71. Luting Yan, Kah Howe Chan, **Ashraf Uddin**, “Dopamine-Induced Growth of Au and Ag Nanoparticles on ITO Substrate and Their Application in PCPDTBT-Based Polymer Solar Cell”, *Plasmonics* (2016) p1-7, (doi:10.1007/s11468-016-0270-x). [IF: 2.2; Citations: 1]
70. Naveen Kumar Elumalai and **Ashraf Uddin**, “Open circuit voltage of organic solar cells: an in-depth review” *Energy Environ. Sci.*, 9 (2016) p391—410 [IF: 25.43; Citations: 48]
69. Matthew Wright, Rui Lin, Murad Tayebjee, Binesh Puthen Vettil, Yu Jiang, Xueting Liang, **Ashraf Uddin** and Gavin Conibeer, “Effect of blend composition on ternary blend organic solar cells using a low band gap polymer”, *Synthetic Metals* 212 (2016) p142-153. [IF: 1.8; Citations: 2]
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67. Naveen Kumar Elumalai, Chellappan Vijila, Rajan Jose, **Ashraf Uddin** and Seeram Ramakrishna, “Metal oxide semiconducting interfacial layers for photovoltaic and photocatalytic applications”, *Mater Renew Sustain Energy* (2015) 4:11 DOI 10.1007/s40243-015-0054-9. [IF: TBA; Citations: 18]
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54. **A. Uddin**, H. S. Wong and C. C. Teo “CdSe/ZnS quantum dot size dependent carrier relaxation in hybrid organic/inorganic system”, *J. of Nanoscience and Nanotechnology* 12 (2012) 1–7. [IF: 1.3; Citations: 8]
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(d) Some of the workshops:

5. **A. Uddin**, C. B. Lee and X. Hu "Fabrication of multi-color organic light emitting diodes", CoE technology exhibition, 8 – 13 March 2005.
4. C. B. Lee, **A. Uddin** and X. Hu, "Investigation of Alq₃ Film Quality for Different Thermal Evaporation Rates", Workshop on Thin Films organized by MPE/NTU, 8 – 9 January 2004.
3. T. Wong, **A. Uddin**, X. W. Sun and X. Hu, "Rare earth chelate complexes and electro-chemically deposited PBTh with nano-scale surface morphology", Nano-science & nano-technology seminar, NUS, 27 Feb. 2004.

2. **A. Uddin**, X. Hu and C. B. Lee, “Organic semiconductor materials for advance foldable display”, CoE/NTU technology exhibition, 8 – 13 March 2004.
1. **A. Uddin**, “Deposition and investigation of electrical and optical properties of organic semiconductor materials”, A*star workshop, IMRE, 2 -3 October 2003.

(e) List of Patents:

17. **Ashraf Uddin** and Naveen Kumar Elumalai, “High Efficiency Organic–Silicon Tandem Solar Cells (the Technology)”, (UNSW Ref. 2017-077).
16. **Ashraf Uddin** and Naveen Kumar Elumalai, “A photovoltaic cell and a method of forming a photovoltaic cell”, US patent application (Application No. 15/503075, on 15 March 2017).
15. **Ashraf Uddin** and Naveen Kumar Elumalai, “A method of forming a light absorbing layer for a photovoltaic cell and a photovoltaic cell comprising the light-absorbing layer”, Australian provisional patent application (application number 2016904157 on 13/10/2016)
14. **Ashraf Uddin** and Naveen Kumar Elumalai, “A photovoltaic cell and a method of forming a photovoltaic cell”, ((application number 2016904145 on 13/10/2016)
13. **Ashraf Uddin**, “Application of graphene on perovskite solar cells (the ‘Technology’)", (UNSW Ref. 2015-050).
12. **Ashraf Uddin** and Naveen Elumalai, “Flexible and translucent perovskite solar cells with high stability for building-integrated photovoltaic applications” (UNSW Ref. 2015-041).
11. **Ashraf Uddin** “A photovoltaic cell and a method of forming a photovoltaic cell”, patent no. WO 2016/023064 A1.
10. **Ashraf Uddin** and Lihui Song, “DESIGN OF HIGH EFFICIENCY ORGANIC SOLAR CELLS”, submitted to NSi office, UNSW (Ref. 10-2560).

9. **Ashraf Uddin**, Alex See and Lap Chan, "HIGH PERFORMANCE STRAINED-Si CHANNEL MOSFET ON SiGe/SiO₂ LAYERS", (Patent is filed in US Patent Office, 2005).
8. **Ashraf Uddin**, "SILICON CARBIDE THIN FILM TRANSISTOR ON GLASS SUBSTRATE", (Patent was registered in Japan in 1997. I do not know the registration number as I have been out of Japan since Feb. 1997)
7. **Ashraf Uddin** and Fumio Ueno, "SILICON CARBIDE X- AND γ -RAYS DETECTORS", (Patent was registered in Japan in 1997. I do not know the registration number as I have been out of Japan since Feb. 1997)
6. **Uddin Ashraf** and Fumio Ueno, "RADIATION DETECTOR", US Patent no. # 5,581,087 (Dec. 3, 1996)
5. **Ashraf Uddin**, "HIGH RESPONSE ULTRA-VIOLET PHOTO-DETECTORS OF SILICON CARBIDE", Japanese Patent no. # 1995-94773
4. **Ashraf Uddin**, "HIGH RESPONSE RECOMBINATION BASE PHOTOTRANSISTOR", Japanese Patent no. # 1995-91034
3. **Ashraf Uddin** and Tsutomu Uemoto, "DOPING ENGINEERING OF P-TYPE ZnSe BY THE HELP OF VERY THIN LAYERS OF SECOND MATERIALS", Japanese. Patent no. # 1994-97506
2. **Ashraf Uddin**, "OHMIC CONTACTS AND EASY THERMO COMPRESSION BONDING TO ALPHA SILICON CARBIDE", Japanese Patent no. # 1994-94237
1. **Ashraf Uddin** and Tsutomu Uemoto, "GRADIENT DOPING HIGH EFFICIENT BLUE LIGHT EMITTING DIODE FORMED IN SILICON CARBIDE", Japanese Patent no. # 1993-304314

#N.B: Toshiba Corporation, Japan is using two of my patents 6 and 7 for their commercial products.