Arun Tej Mallajosyula

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Education

Indian Institute of Technology Kanpur, Kanpur, India
Ph.D. in Electrical Engineering (2011) CPI-9.5/10.0
Thesis: Effects of Single Walled Carbon Nanotubes on the Morphological and Optoelectronic Properties of Poly-3(hexylthiophene) Based Solar Cells.
Advisors: Profs. Baquer Mazhari and S. Sundar Kumar Iyer

National Institute of Technology Karnataka, Surathkal, India
M.Tech in Industrial Electronics (2004) Aggr.-81%
Thesis: Design and Implementation of the Improved Successive Approximation Architecture for Low-Power CMOS A/D Converter.
Advisor: Prof. T. Laxminidhi

Gandhi Institute of Technology and Management, Andhra University, Visakhapatnam, India
B.E. in Electronics and Instrumentation Engineering (2002) Aggr.-76%
Project: PC Based Pre-setting Sequence Generator for an Autonomous Underwater Vehicle.
Advisors: Prof. P. Ramesh and Dr. C.D. Malleswar (Naval Science and Technological Laboratories)

Professional Experience

Post-doctoral Research Fellow (Sep. 2013 - Current)
Materials Physics and Applications Division,
Los Alamos National Laboratory, United States of America

Post-doctoral Research Fellow (Feb. 2013 - Aug. 2013)
Organic and Nanomaterials Laboratory, Department of Materials Science and Engg.,
National University of Singapore, Singapore

Principal Engineer (R&D) (Sep. 2011 - Nov. 2012)
Test Chip Design Department, Design Methodology Division
Taiwan Semiconductor Manufacturing Co., Hsinchu Science Park, Taiwan

Research Experience

Doctoral research in the laboratories of Samtel Centre for Display Technologies at I.I.T. Kanpur included organic semiconductor device fabrication, testing, and material and thin film characterization. Spectroscopy, spectral response and nanomorphology studies were employed to determine the differences in charge generation mechanisms at the polymer-nanotube, polymer-fullerene and metal-semiconductor interfaces. Device characterization techniques were extensively employed to determine the role of SWNTs in improving charge transport, collection, and in reducing charge recombination in photovoltaic devices.

Device Fabrication: Thermal Evaporation, Electron Beam Evaporation, DC Magnetron Sputtering, Spin Coating, Dispersion of Nanotubes and Nanoparticles, Ozone and Oxygen Plasma Treatment, Photolithography, Encapsulation in Glove Box, and Working in Clean Room Environment.

Material and Thin Film Characterization: Raman Spectroscopy, Photoluminescence Quantum Efficiency, Transient Photoluminescence, Electroluminescence, Absorption Spectroscopy and Efficiency, Work Function Measurement with Kelvin Probe, Surface Profilometry, Scanning Electron Microscopy, Transmission Electron Microscopy, and Atomic Force Microscopy.

Device Characterization: Current – Voltage Measurement with Microprobe Station and Solar Simulator, Low-temperature Current – Voltage Measurement, Capacitance – Voltage Measurement, Impedance Spectroscopy, and Spectral Response Measurement.

Research Areas of Interest

Photovoltaic Devices, Organic Optoelectronics, Large Area and Printable Electronics, Nanomaterials and their Applications, and Semiconductor Device Physics.

Publications

Journals

1. **A.T. Mallajosyula**, S.S.K. Iyer, and B. Mazhari, Charge Transport in Polythiophene:Fullerene:Nanotube Bulk Heterojunction Photovoltaic Devices Investigated by Impedance Spectroscopy, *Curr. Appl. Phys.*, 2012 *(accepted; DOI: 10.1016/j.cap.2012.11.007)*.
2. **A.T. Mallajosyula**, S.S.K. Iyer, and B. Mazhari, Capacitance-Voltage Characteristics of P3HT:PCBM Bulk Heterojunction Solar Cells with Ohmic Contacts and the Impact of Single Walled Carbon Nanotubes on them, *Org. Electr.*, 13, 7, 2012.
3. **A.T. Mallajosyula**, S.S.K. Iyer, and B. Mazhari, Improving the Efficiency of Charge Extraction Limited P3HT:PCBM Solar Cells Using SWNTs with Metallic Characteristics, *J. Appl. Phys.*, 109, 12 , 2011.
4. **A.T. Mallajosyula**, S.S.K. Iyer, and B. Mazhari, Role of Single Walled Carbon Nanotubes in Improving the Efficiency of Poly-(3-hexylthiophene) Based Organic Solar Cells, *J. Appl. Phys.*, 108, 10, 2010.
5. **A.T. Mallajosyula**, N. Srivastava, S.S.K. Iyer, and B. Mazhari, Characterization of Matrix and Isolated Organic Solar Cells, *Sol. Energy Mater. Sol. Cells*, 94, 8, 2010.
6. **A.T. Mallajosyula**, S.S.K. Iyer, and B. Mazhari, A Comparative Study of Poly (3-octylthiophene) and Poly (3-hexylthiophene) Solar Cells Blended with Single Walled Carbon Nanotubes, *Jpn. J. Appl. Phys.*, 48, 11503, 2009.
7. V. Jain, B.K. Rajbongshi, **A.T. Mallajosyula**, G. Bhattacharjya, S.S.K. Iyer, and G. Ramanathan, Photovoltaic Effect in Single-Layer Organic Solar Cell Devices Fabricated with Two New Imidazolin-5-one Molecules, *Sol. Energy Mater. Sol. Cells*, 92, 9, 2008.

Conference Proceedings

1. **A.T. Mallajosyula**, S.S.K. Iyer, and B. Mazhari, Role of Single Walled Carbon Nanotubes in Improving the Efficiency of P3HT:PCBM Solar Cells - Impedance Spectroscopy and Morphology Studies, *Proc. 35th IEEE Photovoltaics Specialists Conf.*, pp. 95-101, Hawaii, 2010.
2. **A.T. Mallajosyula**, S.S.K. Iyer, and B. Mazhari, Enhanced Performance of Poly-3(hexylthiophene) – Single Walled Carbon Nanotube Bulk Heterojunction Solar Cells using a Poly-3(hexylthiophene) Buffer Layer and Ca Electrode, *Proc. 34th IEEE Photovoltaics Specialists Conf.*, pp. 748-753, Philadelphia, 2009.
3. **A.T. Mallajosyula**, S.S.K. Iyer, and B. Mazhari, Fill Factor and Short Circuit Current Improvement in P3HT:PCBM Solar Cells Incorporating Single Walled Carbon Nanotubes, *Proc. 15th Intl. Workshop on the Physics of Semiconductor Devices*, New Delhi, 2009.
4. **A.T. Mallajosyula**, S.S.K. Iyer, and B. Mazhari, Conduction Properties of Carbon Nanotubes in P3HT:SWNT Bulk Heterojunction Solar Cells, *Proc. 33rd IEEE Photovoltaics Specialists Conf.*, pp. 1-6, San Diego, May, 2008.
5. **A.T. Mallajosyula**, S.S.K. Iyer, and B. Mazhari, Effect of Single Walled Carbon Nanotubes on the Performance of Poly-(3-hexylthiophene) Solar Cell, *Proc. 2nd IEEE Intl. Nanoelectronics Conf.*, pp. 550-554, Shanghai, 2008.
6. G. Bhattacharjya, **A.T. Malljosyula**, S.S.K. Iyer and G. Ramanathan, Imidazolin-5-ones in organic semiconductor diodes, *Proc. Intl. Conf. on Molecules to Materials*, pp. 8-12, Longowal, 2006.
7. V. Jain, G. Bhattacharjya, **A.T. Mallajosyula**, C.K. Suman , R. Gurunath , and S.S.K. Iyer, Study of Optical and Electrical Properties of Imidazolin-5-One Molecules for Opto-Electronic Applications, *Proc. 9th Asian Symposium on Information Display*, pp 244-247, New Delhi, 2006.

Conference Presentations

1. **A.T. Mallajosyula**, N. Srivastava, S.S.K. Iyer, and B. Mazhari, Comparision of Organic Solar Cells in Matrix and Pixel Configurations, *National Conf. on the Emerging Trends in the Photovoltaic Energy Generation and Utilization*, Kanpur, Mar., 2008.
2. N. Sahai, **A.T. Mallajosyula**, N. Srivastava, and S.S.K. Iyer, Effect of Thin Oxide Barrier Layers at Calcium-Aluminium Cathode on Bulk Heterojunction Organic Solar Cell Characteristics, *National Conf. on the Emerging Trends in the Photovoltaic Energy Generation and Utilization*, Kanpur, Mar., 2008.

3. N. Srivastava, **A.T. Mallajosyula**, N. Sahai, S.S.K. Iyer, Effect of Polyethylene dioxythiophene : Polystyrene sulphonic acid Layer on the Performance of Organic Solar Cells, *Intl. and INCCOM-6 Conf. on Future Trends in Composite Materials and Processing*, Kanpur, Dec., 2007.
4. **A.T. Mallajosyula** and S.S.K. Iyer, Carbon Nanotube based Bulk Heterojunction Organic Solar Cells, *National Conf. on Smart Materials and Recent Trends*, S.V. University, Tirupati, Feb., 2007.

Patents Filed

- V. Jain., G. Bhattacharjya, B.K. Rajbongshi, **A.T. Mallajosyula**, G. Ramanathan, S.S.K. Iyer, An Improved Organic Optoelectronic Device, No. 1231/DEL/2007.
- **A.T. Mallajosyula** and S.S.K. Iyer, Lateral Organic Photovoltaic Cells with Thin Films of Carbon Nanotubes *p-n* Junctions, No. 933/DEL/2006.

Teaching Experience

Device Fabrication Instructor: Summer and Winter Schools on Organic Electronics, Molecular Electronics, and Photovoltaic Systems organized by the Department of Science and Technology and Samtel Centre for Display Technologies, I.I.T. Kanpur, 2005-2010.

Tutor: Digital Electronics and Microprocessors Technology, Electrical Engineering – I and II (Microelectronic Circuits), I.I.T. Kanpur

Teaching Assistant: Organic Electronics, I.I.T. Kanpur

Awards/Achievements

- Gold medal for best graduating student, B.E. (E.I.E.), Andhra University, 1998-2002.
- All India rank of 43 in Graduate Aptitude Test for Engineers (GATE), 2002.

University Service

- President and Convenor, Hall of Residence – 8, I.I.T. Kanpur, 2006-2007.
- Vice-Chairman, IEEE Student Branch, N.I.T.K., Surathkal, 2004.
- Department Student Guide, I.I.T. Kanpur Counselling Service, 2007-2008.
- Member, Student Organizing Team, 9th Asian Symposium for Information Display, New Delhi, 2006.
- Member, Student Organizing Team, INTERFACE (National Conference), G.I.T.A.M., Andhra University, 2002.

References

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Prof. S. Sundar Kumar Iyer,
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