

ASHISH KIRANBHAI PANCHAL

Contact

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Qualifications

B.E. (Electrical) 1996, SVRCET, Surat
M.Tech. (Energy Systems Engineering) 2003, IIT Bombay
Ph.D. (On going) 2009, IIT Bombay

Area of interest

Renewable energy technologies, Silicon based solar cells technology, micro and nano materials characterization techniques, advanced electrical power systems

Teaching Experience

- Lecturer (Ad hoc) in Electrical Engineering Department, SVRCET, September-1996 to June-1997
- Lecturer in Electrical Engineering Department, SCET, June-1997 to December-1997
- Lecturer in Electrical Engineering Department, SVNIT, January-1998 to January-2006
- Assistant Professor in Electrical Engineering Department, SVNIT, January-2006 to till date

Subjects taught

Electrical technology, Electrical Networks, Electrical Power Systems, Flexible AC Transmission, Switch Gear and Protecting Devices, Solar Photovoltaic fundamentals and Technologies

Ph.D. Thesis

Title: "Silicon quantum dots embedded in silicon nitride dielectric multilayer prepared using hot-wire chemical deposition technique for solar cell application"

Abstract: Silicon based solar cell technology has low efficiency due to its inability to cover whole solar spectrum of visible light. When Silicon size is reduced in the nano-regime (< 10 nm), its band gap energy increases. This Silicon structures are known as Silicon quantum dots. This property is helpful for increasing the light absorption as well as to improve electrical charge transportation. This research work targets to increase the Si solar cell efficiency in the area of all silicon tandem solar cell projects for third generation solar cell technology. In this work, Silicon quantum dots embedded in silicon nitride dielectric multilayer films are prepared using hot-wire chemical vapor deposition technique at IIT Bombay. All the films are analyzed by structural, chemical and electrical characterizations techniques. Finally, this multilayer film is included in a p-i-n solar cell device as an absorber layer (middle i-layer). These devices have exhibited

excellent light absorption in the short wavelength range. This work is supervised by Prof. C.S. Solanki at IIT Bombay and is funded by Applied Materials, USA.

Achievements

- Gold Medal for securing highest marks in Electrical Power Systems Subjects at BE IV (Electrical) examination conducted by South Gujarat University, Surat.
- QIP scholarship during M.Tech. studies at IIT Bombay for 18 months.
- Best paper presentation award at 18th International Photovoltaic Solar Energy Conference-2009 (PVSEC-2009) held by JadHAVpur University, Kolkata.

Seminar/lectures delivered

- SCET, Surat
- IIT Bombay, Mumbai
- Visited Imperial College, London, UK
- Visited Applied Materials (AMAT), San Jose, California, USA
- MIT, Cambridge, USA
- Purdue University, Indiana, USA
- Visited UIUC, Illinois, USA

Papers published in international journals

- **A.K.Panchal**, C.S.Solanki, "Post deposition annealing temperature effect on silicon quantum dots embedded in silicon nitride dielectric multilayer prepared by hot-wire chemical vapor deposition", Thin Solid Films 517(12) (2009)3488-349.
- **A.K.Panchal**, C.S.Solanki, "Fabrication of silicon quantum dots in SiN_x multilayer using hot-wire CVD", Journal of Crystal Growth 311(9) (2009) 2659-2663.
- **A.K.Panchal**, D.K.Rai, M.Mathew, C.S.Solanki, "Silicon quantum dots in silicon nitride dielectric- A review", Nano Brief Reports and Reviews, October 2009.
- **A.K.Panchal**, D.K.Rai, M.Mathew, C.S.Solanki, "Electrical properties of the as-deposited and annealed a-Si/SiN_x multilayer rfilms prepared using hot-wire chemical vapor deposition" submitted to Thin Solid Films.
- **A.K.Panchal**, D.K.Rai, M.Mathew, C.S.Solanki, "Photovoltaic devices with Si quantum wells and dots structures in SiN_x dielectric" submitted to Progress in Photovoltaic: Research and Applications.

Papers in international conferences

- **A.K.Panchal**, "Voltage stability of a large grid" paper presented at the 7th International Power Engineering Conference (IPEC-2005) held at Singapore, December 2005.
- **A.K. Panchal**, C. S. Solanki, S.N.Ghosh, "Energy analysis of thin film crystalline silicon solar cell technologies" poster presented at European Materials Research Society (EMRS) 2007 Symposia held at Strasbourg, France, May-June 2007.

- Antisen A. M., **A. K. Panchal**, C.S. Solanki, “Precipitation of Si nanocrystals in Si-rich Silicon nitride layers deposited using HWCVD” paper presented at 5th International Conference on Hot-Wire Chemical Vapor Deposition (HWCVD5) held at MIT USA, August-2008.
- **A.K.Panchal**, C.S.Solanki, “Post deposition annealing temperature effect on silicon quantum dots embedded in silicon nitride dielectric multilayer prepared by hot-wire chemical vapor deposition”, paper presented at 5th International Conference on Hot-Wire Chemical Vapor Deposition (HWCVD5) held at MIT USA, August-2008.
- **A. K. Panchal**, D. K. Rai, C. S. Solanki, “Electrical characterization of Si-QD/SiN_x multilayer prepared using HWCVD” paper presented at PVSEC18 International Conference Kolkata, January-2009. This paper also won the best poster presentation award.
- **A.K.Panchal**, D.K.Rai, M.Mathew, C.S.Solanki, “Effects of substrate temperature and SiH₄ cracking time on a-Si/SiN_x multilayer prepared using HWCVD” paper to be presented at International Workshop on Physics of Semiconductor Devices (IWPSD-2009) at Jamia Melia Islamia, New Delhi, December-2009.