NINAD PIMPARKAR

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RESEARCH INTERESTS:

Applied research in the area of device physics, nanocomposites and random media for modeling, characterization and measurement of nanoscale electronic devices. I enjoy addressing challenging problems, understanding the essential physics and closely collaborating with experimentalists to develop simulation approaches and tools useful in modeling and designing novel experiments.

EDUCATION:

Ph.D. in Electrical and Computer Engineering, May 2008 (expected), **Purdue University,** IN
Electronic and Photovoltaic Properties of Nanocomposite Thin Film Transistors

B. Tech. and *M. Tech*. in Electrical Engineering, July 2003, in **Indian Institute of Technology (IIT)** - Bombay, India**.** Influence of Fiber Dispersion and Nonlinearity on Performance of Optical CDMA Systems

RESEARCH HIGHLIGHTS:

Simulation, modeling of nanoscale devices (2004 - present): This research work is aimed at developing a comprehensive computational model using percolation theory and device physics for electronic transport in Nanobundle Thin Film Transistors (NB-TFT). NB-TFTs are composed of networks of Carbon Nanotubes (CNT) and Silicon Nanowire (SiNW) embedded in plastic substrates for macro-electronics and photovoltaic applications.
With close collaboration with experimentalists, the model provides interpretations for a wide range of experimental results for NB-TFT.

Summer Intern at Motorola Inc.(May 2007 – Aug 2007): This work involved electrical burning, characterization and measurement of nanoscale random network devices for the applications in macroelectronics and flexible electronics.

Online Nano-electronics Software Development: Developed user friendly interactive software NanoNET with GUI to simulate the device characteristics of NB-TFTs. NanoNET employs parallel programming algorithm and is available online at http://www.nanohub.org.

Magnetic separation of diamagnetic particles (July 2003 - July 2004): Modeling of magnetic separation of blood components based of the magnetic properties and particle size. This project involved simulations of 3D magnetic fields and dynamic particle separation based on different flow rates.

Electronic Design Project: Architecture for Voice over IP (VoIP): This project involved building a system that enabled the ordinary telephones to communicate with other telephones or computers, over the IP network.

TEACHING EXPERIENCE:

- Purdue University, IN, Fall 2003, Spring 2004, Fall 2004
- Indian Institute of Technology (IIT) - Bombay, India Fall 2002, Spring 2003

HONORS AND ACTIVITIES:

- Ranked in top **0.4 % in 150,000** high school seniors at the joint entrance examination for entrance to **Indian Institute of Technology (IIT), Bombay**.
- Member of **Student Leadership Council (SLC)** at Purdue: Started the student seminar series for graduate students.
- **President** of a cultural group at Purdue**:** Organized cultural festivals and *acted in plays.*
- Member of **Toastmasters** International Club**:** Gave many speeches as a member of *public speaking* club.

COMPUTER SKILLS:

- Programming Languages : C, Shell Script, Python
- Operating Systems : Linux, Windows 2K/XP/NT, DOS
- Software Packages/Libraries : Matlab, Medici, LaTeX, NanoNET, SAS, IC-CAP

SELECTED PUBLICATIONS

Journal Papers:

1. C. Kocabas, **N. Pimparkar**, O. Yesilyurt, M. A. Alam, and J. A. Rogers, "Experimental and Theoretical Studies of Transport through Large Scale, Partially Aligned Arrays of Single Walled Carbon Nanotubes in Thin Film Type Transistors," Nano Letters, 7, 1195, 2007.
2. **N. Pimparkar**, J. Guo, and M. A. Alam, "Performance Assessment of Sub-Percolating Nanobundle Network Transistors by an Analytical Model," IEEE Tra. of Elect. Dev., 54, 637, 2007.
3. **N. Pimparkar**, C. Kocabas, S. Kang, J. A. Rogers, J. Y. Murthy, and M. A. Alam, "Limits of Performance Gain of Aligned CNT over Randomized Network: Theoretical Predictions and Experimental Validation," Elect. Device. Lett., 28, 593, 2007 .
4. **N. Pimparkar**, S. Kumar, Q. Cao, J. A. Rogers, J. Y. Murthy, and M. A. Alam, "Current-Voltage Characteristics of Long-Channel Nanobundle Thin-Film Transistors: A 'Bottom-up' Perspective," Elect. Device. Lett.,28, 157, 2007.
5. S. J. Kang, C. Kocabas, T. Ozel, M. Shim, **N. Pimparkar**, M. A. Alam, and J. A. Rogers, "High Performance Electronics Based on Dense, Perfectly Aligned Arrays of Single Walled Carbon Nanotubes," Nature Nanotechnology, 2, 230, 2007
6. M. A. Alam, **N. Pimparkar**, S. Kumar, and J. Murthy, "Theory of nanocomposite network transistors for macroelectronics applications," MRS Bulletin, 31, 466, 2006 **(Invited)**.
7. S. Kumar, **N. Pimparkar**, J. Y. Murthy, and M. A. Alam, "Theory of transfer characteristics of nanotube network transistors," Appl. Phys. Lett., 88, 123505 (2006).
8. S. Ju, J. Li, **N. Pimparkar**, M. A. Alam, R. Chang, D. B. Janes, "N-Type Field-Effect Transistors Using Multiple Mg-Doped ZnO Nanorods", IEEE Tran. Nanotech., 6, 390, 2007.

Conference Proceedings:

1. **N. Pimparkar**, C. Kocabas, S. J. Kang, J. Rogers and M. A. Alam, "Prediction of Five-fold Increase in Current Gain of Optimally Aligned CNT Network over Random Networks", Proc. of MRS Spring Meeting, 2007.
2. **N. Pimparkar**, J. Guo, and M. A. Alam, "Theoretical Model for the Nanobundle Network Transistors Below and Above Percolation Limit," NSTI Nanotech 2006.
3. **N. Pimparkar**, J. Guo, and M. A. Alam, "Performance Assessment of Sub-Percolating Nanobundle Network Transistors by an Analytical Model," IEDM Tech. Digest, 21.5, 541, 2005.
4. **N. Pimparkar**, and M. A. Alam, "A 'Bottom-up' Redefinition for Mobility and the Effect of Poor Tube-Tube Contact on the Performance of CNT Nanobundle Thin Film Transistors", Device Research Conference, Notre Dame, Indiana, June, 2007.
5. M. A. Alam, **N. Pimparkar**, S. Kumar, and J. Y. Murthy," The Short and Long Channel Pick-up Stick Transistors: A Promising Technology for Micro- and Macro-Electronics," ISDRS, December 2005. **(Invited)**

6. M. A. Alam, **N. Pimparkar**, S. Kumar, and J. Murthy, "Percolation and Fractal Geometry: How Spatial Inhomogeneity is Reshaping Modern Semiconductor Devices", Device Research Conference, Notre Dame, Indiana, June, 2007. **(Invited)**
7. M. A. Alam and **N. Pimparkar**, "Theory and Performance of Nanocomposite Sensors" Microwave Theory and Techniques Conference, Hawaii, June, 2007. **(Invited)**
8. M. A. Alam and **N. Pimparkar**, "Nanocomposite Transistors: A Novel Technology for Macroelectronic Applications", Columbia University ECE Lecture Series, Sept., 2006. **(Invited)**

GRADUATE COURSEWORK:

Solid State Devices I	Quantum Phenomena in Semiconductor	Electromagnetic Field Theory
Solid State Devices II	Reliability Physics of Nanoscale Transistors	Electromagnetic Field Theory
Advanced VLSI Devices	Electron Transport in Semiconductor	Complex Analysis

REFERENCES:

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