

Global Summer Lecture Series 2008

Seminar 1 July 10, 2008

PACE: Audio-Visual Hall, Suita Branch Library, Suita Campus

TIME: 14:00 – 15:00

Seizo Morita (Osaka University)

“Atom-by-Atom Bottom-up Nanostructuring System Based on Atomic Force Microscopy”



Abstract

We have been developing a novel bottom-up nanostructuring system based on atomic force microscopy (AFM) in ultra high vacuum (UHV). It can identify chemical species of individual atoms and then manipulate selected atom species to the designed site one-by-one to assemble complicated nanostructures consisted of many atom species at room temperature (RT). In this tutorial lecture, we will introduce the state of art of high performance AFM and the future prosperct of atom-by-atom bottom-up nanostructuring system based on AFM.

Curriculum Vitae

April, 1972 to March, 1975, Osaka University (Doctor of Science, 1975)

PhD Student, Doctor Course of Department of Physics, Graduate School of Science

April, 1975 to March,1988, Tohoku University (Research Associate & Associate Professor)

April, 1988 to November, 1989, Iwate University (Professor)

December 1989 to March, 1996, Hiroshima University (Professor)

April, 1996 to date, Osaka University (Professor)

Information [NEXT Seminar]

「Seminar Tour in Fukui Prefecture」 July 16-18 2008

Masaaki Kuzuhara (Fukui University)

“Future Prospects of III-Nitride Semiconductor Electron Devices”

Masanori Ozaki (Osaka University)

“The Frontiers of Liquid Crystal Science and Device Technology”

Kenji Taniguchi (Osaka University)

“Fundamental Semiconductor process/device physics”

Global Summer Lecture Series 2008

Seminar 1 July 10, 2008

PLACE: Audio-Visual Hall, Suita Branch Library, Suita Campus

TIME: 15:00 – 17:00

Invited Speaker

Dimitri Antoniadis(MIT,USA)

“Technology Trends and Options for High Performance CMOS FETs at the 15-nm Generation and Beyond”



Abstract

The historical evolution of High Performance (HP) CMOS and the trends projected by the 2007 ITRS are critically examined. As in the ITRS, it is assumed that basic lithography and back-end scaling will continue well into the future according to their own roadmap and therefore only the aspects of FET dimensional and performance scaling are evaluated. Recent trends and research directions in performance boosters such as maximized strain in pure Si channels, new channel materials consisting of Ge, and Si/Ge and III-V heterostructures, and the required hi-k-metal-gate stack properties are surveyed and analyzed in context of device structures suitable for the 15-nm CMOS generation. Issues of source/drain resistance and gate capacitance as they affect FET performance are also discussed. Finally, tradeoffs between performance and power dissipation are also examined under different FET scaling scenaria.

Curriculum Vitae

Dimitri A. Antoniadis was born in Athens Greece. He received his B.S. in Physics from the National University of Athens in 1970 and his Ph.D. in Electrical Engineering in 1976 from Stanford University. He joined the MIT faculty in 1978 where he is the Ray and Maria Stata chaired professor of Electrical Engineering. He is author or coauthor of over 300 technical articles. His present research focuses on the physics and technology of nano-scale CMOS and memory devices. Currently he is Director of the multi-university Focus Research Center for Materials Structures and Devices centered at MIT. He is Fellow of the IEEE, member of the National Academy of Engineering, and recipient of several professional awards.

Seminar 2 July 17, 2008

「Seminar Tour in Fukui Prefecture」

PLACE: Hotel Grandia Housen

TIME: 9:00 – 10:30

Masaaki Kuzuhara (Fukui University)

“Future Prospects of III-Nitride Semiconductor Electron Devices”



Abstract

This lecture is intended to give an overview of wide-bandgap semiconductor electron device technologies. Emphasis is on promising future prospects of novel III-nitride heterojunction transistors for applications in power electronics as well as in information electronics. Fundamental material properties, basic device operation principles and device fabrication process technologies will be addressed.

Curriculum Vitae

Kyoto University

- BE, Electrical Engineering, 1979
- ME, Electrical Engineering, 1981

NEC Corporation, 1981-2003

- Member of Technical Staff, 1981-1986
- Visiting Researcher at University of Illinois, 1987-1988
- Supervisor at Microelectronics Res. Labs., 1988-1990
- Manager at Kansai Electronics Res. Labs., 1991-1996
- Senior Manager at Kansai Electronics Res. Labs., 1998-2003

University of Fukui, 2004-Present

- Professor, Department of Electrical and Electronics Engineering

Seminar 2 July 17, 2008

「Seminar Tour in Fukui Prefecture」

PLACE: Hotel Grandia Housen

TIME: 10:30 – 12:00

Masanori Ozaki (Osaka University)

“The Frontiers of Liquid Crystal Science and Device Technology”



Abstract

The liquid crystal display (LCD) is the key device as a man-machine interface in the ICT society. In this lecture, first the fundamentals of liquid crystal materials and devices are described, and then the evolution and recent trends in LCD are surveyed. Finally, emerging technologies in liquid crystal devices including non-display application will be also discussed.

Curriculum Vitae

Education:

1983 B.Eng., 1985 M.Eng., 1988 Ph.D., Department of Electrical Eng., Osaka University

Academic and Professional Experience:

1988-91 Research Associate, 1991-94 Assistant Professor, Department of Electronic Eng.,
Osaka University

1994-2000 Associate Professor, Department of Electronics, Information and Energy Science,
Osaka University

1994- 95 Post Doctoral Fellow, Department of Physics, University of Utah

2000-05 Associate Professor, Department of Electronic Eng., Osaka University

2005-present Professor, Department of Electrical, Electronic and Information Eng.,
Osaka University

Seminar 3 July 18, 2008

「Seminar Tour in Fukui Prefecture」

PLACE: Hotel Grandia Housen

TIME: 9:00 – 10:30

Kenji Taniguchi (Osaka University)

“Fundamental Semiconductor process/device physics”



Abstract

devices such as diode, MOSFET, and optoelectronic devices based on classical and quantum properties of radiation and matter. The lecture also introduces the theory and technology of micro/nano fabrication focusing on basic processing techniques such as diffusion, oxidation, and ion-implantation.

Curriculum Vitae

1996 - present Osaka University, Graduate School of Engineering Professor

1986 - 1996 Osaka University, Faculty of Engineering Associate professor

1983 - 1986 Toshiba Co., ULSI Laboratory Senior Researcher

1984 - 1985 Osaka University, Faculty of Engineering Part-time Lecturer

1982 - 1983 MIT, Advanced Engineering Study Visiting Scientist

1975 - 1982 Toshiba Co., Central Research Laboratory Researcher

Information [NEXT Seminar]

PLACE: Audio-Visual Hall, Suita Branch Library, Suita Campus

TIME: 10:00 – 12:00

July 25, 2008

Tetuya Yagi (Osaka University)

“A VLSI system that emulates the computation of primary visual cortical neurons”

Kenichi Kitayama (Osaka University)

“All-optical RAM-based buffer for packet switch”

Global Summer Lecture Series 2008

Seminar 4 July 25, 2008

PLACE: Audio-Visual Hall, Suita Branch Library, Suita Campus

TIME: 10:00 – 11:00

Tetsuya Yagi (Osaka University)

“A VLSI system that emulates the computation of primary visual cortical neurons”



Abstract

The brain computes sensory information with a quite different algorithm/architecture from the one that current engineering systems are operating with. We are aiming at reconstructing the unique algorithm/architecture with the silicon technology not only to develop novel computer systems but also to disclose computational principles underlying the neuronal network of the brain. We have designed an analog VLSI (Very Large Scale Integrated) circuit mimicking the parallel architecture and computations of the primary visual cortex. The VLSI system consists of two artificial retinas and multiple VLSI circuits. I will introduce the system and demonstrate several applications conducted in our laboratory. I will also refer to possible applications of the system as visual prostheses to restore vision in blind patients.

Curriculum Vitae

Education :

March 1979 **B. Sci. Nagoya University**
March 1981 **M. Eng. Nagoya University**
March 1985 **Dr. Med. Sci. Nagoya University**

Professional Carrier :

April 1986 **Postdoctoral Fellow, National Institute of Physiological Science, Okazaki.**
January 1988 **Research Associate, Nagoya Institute of Technology, Nagoya.**
April 1990 **Associate Professor, Kyushu Institute of Technology, Iizuka.**
April 2001 - **Professor, Osaka University, Osaka**
September 1988 – February 1990 **Postdoctoral Fellow, Rockefeller University, New York, USA.**

Global Summer Lecture Series 2008

Seminar 4 July 25, 2008

PLACE: Audio-Visual Hall, Suita Branch Library, Suita Campus

TIME: 11:00 – 12:00

Kenichi Kitayama (Osaka University)

“All-optical RAM-based buffer for packet switch”



Abstract

Key building blocks of packet switch are the switch, the buffer, and the header processor. For

the buffer in conventional optical packet forwarding, optical delay line without random access capability has been only a choice, which severely limits the performance.

In this talk, a challenge to all-optical RAM buffer will be discussed. Focuses are on nano-structured

optical RAM devices, optical addressing technique as its optical interface, buffer design and scheduling as well as its system performance evaluation.

Curriculum Vitae

He received the B.E., M.E., and Dr. Eng. degrees in communication engineering from Osaka University, Osaka, Japan. He joined the NTT Laboratory in 1976. In 1982-1983, he was the Research Fellow at UC Berkeley. In 1995, he joined the Communications Research Laboratory (Presently NICT). Since 1999, he has been the Professor of Osaka University. He is the Fellow of IEEE and IEICE. His research interests are in photonic networks, optical signal processings, OCDMA systems, and radio-over-fiber communication systems. He has published over 220 papers in refereed journals and holds more than 30 patents.

For more details at <http://www.pn.comm.eng.osaka-u.ac.jp/~kitayama/>.