Redox based Resistive Non-volatile Memory Technology

Overview

Over the past few decades, MOSFET-based non-volatile memories have played a significant role in the growth of the portable electronic market. However, aggressive device scaling trends are about to reach their limits. In the quest for the next generation non-volatile memory device, several mechanisms such as redox-based, phase-change, magnetic-junction, and ferroelectrics have recently been extensively investigated. A highly promising candidate that is expected to succeed the flash memory device is the redox-based resistive random access memory (ReRAM). The fundamental requirements of a non-volatile memory are non-destructive write/read operations at a speed comparable to current logic devices, infinite retention, low energy consumption, and integration capability with the current CMOS process.

The objective of this short-term course is to present the current understanding of the physical mechanism of redox-based resistive switching and address technological opportunities and challenges of metal-oxide ReRAMs. Various aspects of the subject will be covered as part of the course with a proper blend of theory and experimentation. The course duration is fixed to five days and the participants will get one credit for the successful completion.

Modules	**A:** Overview of Emerging Non-volatile Memory Technologies **4 December, 2017** **B:** Introduction to ReRAM Technology **5 December, 2017** **C:** Different Technology Platforms for ReRAM Device **6 December, 2017** **D:** Switching Kinetics of ReRAM Memories **7 December, 2017** **E:** Selector Devices for Passive Crossbar Arrays **8 December, 2017** **Exam of the course will be conducted on 9 December, 2017** ***Number of participants for the course will be limited to 50.***
You should attend If…	▪ You are an executive, engineer and researcher from industry and government organizations, including R&D laboratories interested in learning/working in devices and memory technology. ▪ You are a student at all levels (B.Tech/M.Sc/M.Tech/Ph.D) or Faculty from academic institutions interested in pursuing research in related areas.
Fees	The participation fees for taking the course is as follows: • **Participants from abroad : US $300** • **Industry/ Research Organizations: Rs. 5000/-** • **Academic Institutions: Rs. 4000/- (Faculty) & Rs. 1,000/-(Student)** The above fee includes all instructional materials, computer use for tutorials and assignments, laboratory equipment usage and Internet facility.

The Faculty

Foreign Faculty:

Dr. Vikas Rana is a Senior Scientist and head of technology group at Peter Grünberg Institute (PGI-7) at Forschungszentrum Jülich, Germany. His main research interests include emerging memory devices such as metal-oxides, and integration with the contemporary CMOS technology. Previously, he worked at Philips semiconductor, IMEC, and IIT Delhi. He is author and co-author of more than 20 papers in most revered journals such as Nature Materials, Advanced Function Materials, IEEE Transaction on Electron device, many invited talks in conference and book chapter on Metal-oxide Resistive Devices. In 2017, his research has been cited by Economist magazine[1] as a paradigm shift in computation.

Host faculty:

Dr. Lalat Indu Giri, is currently with department of Electronics and Communication Engineering, NIT Goa. He obtained his M. Tech. (materials science) and PhD (microelectronics) degrees from IIT Kanpur and IIT Delhi respectively. He was also a visiting scholar to Laboratory of Physics of Complex Matter, École Polytechnique Fédérale de Lausanne (EPFL), Switzerland under Indo-Swiss PhD student exchange programme. His current research interest includes semiconductor devices, IC Technology and nano materials for energy harvesting.

Location:

National Institute of Technology Goa
Farmagudi, Ponda, Goa-403401, India

Course Duration:

One Week: 04-09 December, 2017

Course Coordinator

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Course Registration Link:

http://www.gian.iitkgp.ac.in/GREGN
http://www.nitgoa.ac.in/gian/

[1]https://www.economist.com/news/science-and-technology/21717807-new-type-processor-small-devices-memory-chip-can-compute