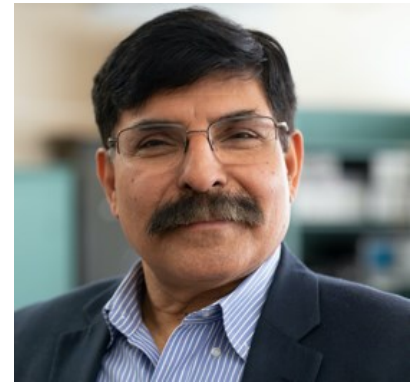


Energy Efficient Devices for In-Memory Computing Hardware

Prof. Durga Misra, Professor
ECE Department Chair, IEEE Fellow
New Jersey Institute of Technology, USA



Abstract:

Data conversion, storing in volatile memories, transmission, and computation impose high energy consumption, latency, and a memory bottleneck. To achieve energy efficiency new low power nanoscale devices are required for the integration of sensing and in-memory computation to efficiently enable Artificial Intelligence (AI) on resource-limited systems. Resistive random-access memory (ReRAM) devices are currently being investigated for possible implementation of artificial intelligence hardware through in-memory computing. The electrical performance in these devices depends on the dielectric deposition process, precise selection of deposition parameters, pre-deposition surface treatments and subsequent thermal budget. The talk will discuss the ReRAM devices with hydrogen plasma treated HfO_2 that have shown low power switching and good conductance quantization with programing pulsed operation that qualify them to be used for in-memory computing. Engineering the distribution of defects or oxygen vacancies near the top and bottom electrodes has a significant impact on reducing the switching power and improving the multi-level cell (MLC) characteristics of the device.

Biography:

Prof. Durga Misra is a Professor and Chair of the Department of Electrical and Computer Engineering, New Jersey Institute of Technology, Newark, USA. His current research interests are in the areas of nanoelectronics devices and circuits, especially in the area of nanometer CMOS gate stacks and switching devices. He is Fellow of IEEE. He is a Distinguished Lecturer of IEEE Electron Devices Society (EDS). He is, also a Fellow of the Electrochemical Society (ECS). He received the Thomas Collinan Award from the Dielectric Science & Technology Division and the Electronic and Photonic Division Award from ECS. He edited and co-edited more than 50 books and conference proceedings in his field of research. He has published more than 200 technical articles in peer reviewed Journals and in International Conference proceedings including more than 100 Invited Talks. He has graduated 20 PhD students and 55 MS students. He received the M.S. and Ph.D. degrees in electrical engineering from the University of Waterloo, Waterloo, ON, Canada, in 1985 and 1988, respectively.