Institute of Microelectronics
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Nano-Silicon Nano-Photonics

GUEST SPEAKER

Prof. Lorenzo Pavesi
Director of Nanoscience Laboratory
Professor of Experimental Physics
University of Trento

When: **17th March 2011, 2.00 p.m. to 3.00 p.m.**
Where: **Institute of Microelectronics, Singapore**
11 Science Park Road Singapore Science Park II Singapore 117685

Abstract

Silicon Photonics is no more an emerging field of research and technology but it is a present reality with commercial products available on the market, where low dimensional silicon (nanosilicon or nano-Si) can play a fundamental role. After a review of the field, the optical properties of silicon reduced to nanometric dimensions are introduced. The use of nano-Si, in the form of Si nanocrystals, in the main building blocks of Silicon Photonics (waveguides, modulators, sources and detectors) is reviewed and discussed. Recent advances of nano-Si devices such as bio-imagers, optical resonators (linear, rings, and disks) are treated. The development of high efficiency light emitting diodes for interchip bidirectional optical interconnects is presented as well as the recent progresses to exploit nano-Si for solar cells. In addition, non-linear optical effects which enable fast all-optical switches are described. On the other hand, another possibility is to confine photons to small dimensions. Here also novel effects which can be further widen the scope of silicon photonics are found. Ultra high bandwidth robust optical switch for UDWDM or active suspended microdisk bistable devices are only two applications where nanophotonics can be appreciated.

About the Speaker

Lorenzo Pavesi is Professor of Experimental Physics at the University of Trento (Italy). Born the 21st of November 1961, he received his PhD in Physics in 1990 at the Ecole Polytechnique Federale of Lausanne (Switzerland). In 1990 he became Assistant Professor, an Associate Professor in 1999 and Full Professor in 2002 at the University of Trento. He leads the Nanoscience Laboratory (25 people), teaches several classes at the Science Faculty of the University of Trento. He founded the research activity in semiconductor optoelectronics at the University of Trento and started several laboratories of photonics, growth and advanced treatment of materials. He is director of the professional master Nano on Micro, coorganized between University and Bruno Kessler Foundation. He is the president and founder of the IEEE italian chapter on Nanotechnology. He has directed more than 20 PhD studens and more than 20 Master thesis students. His research activity concerned the optical properties of semiconductors. During the last years, he concentrated on Silicon based photonics where he looks for the convergence between photonics and electronics by using silicon nanostructures. He is interested in active photonics devices which can be integrated in silicon by using classical waveguides or novel waveguides such as those based on dynamical photonic crystals. His interests encompass also optical sensors or biosensors and solar cells. In silicon photonics, he is one of the worldwide recognized experts, he organized several international conferences, workshops and schools and is a frequently invited speaker. He manages several research projects, both national and international. He advises EC on photonics and is a frequently invited reviewer, monitor or referee for photonics projects by several grant agencies. He is an author or co-author of more than 280 papers, author of several reviews, editor of more than 10 books, author of 2 books and holds six patents. He is in the editorial board of Research Letters in Physics and he was in the editorial board of Journal of Nanoscience and Nanotechnologies, in the directive council of the LENS (Florence), in the Board of Delegates of E-MRS. In 2001 he was awarded the title of Cavaliere by the Italian President for scientific merit. He holds an H-number of 39 according to the web of science.

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Registration

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