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Opto-Canada: SPIE Regional Meeting on Optoelectronics, Photonics, and Imaging, edited by John C. Armitage, Proc. of SPIE Vol. 10313 (Vol. TD 01), 1031301 · © (2002) 2017 SPIE
CCC code: 0277-786X/17/$18 · doi: 10.1117/12.2283797

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Abstracts of Plenary Presentations

Review of Critical DWDM Component Issues and Solutions

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To support increasing traffic, dense wavelength division multiplexing (DWDM) fiber-optic systems have been developed together with several enabling technologies such as new fibers, multiplexers/demultiplexers, optical amplifiers, optical add/drop multiplexers (OADM), switches and routers. There is presently a great deal of research and development performed around these enabling technologies all over the world as they are key network elements to answering the constant demand for more bandwidth. Once these technologies are firmly entrenched, the network of the future will combine increasingly sophisticated DWDM with transmission rates of OC-192 and higher, larger-scale switching, more OADMs, and migration towards an all-optical network. However, deployment will not happen without ensuring system performance, equipment reliability, and compliance with international standards. This presentation will review the critical issues and introduce elements of solutions with results related to establishing and maintaining DWDM optical fiber transmission links for the private networks of large and small carriers.

Research, Commercialization and Education Opportunities in Ultrafast Science and Technology

Wayne H. Knox, Director
Institute of Optics
University of Rochester

We discuss the state of the field of ultrafast science and technology roughly twenty years after the first demonstration of femtosecond pulse generation. In its first evolutionary phase, the field was principally concerned with *measuring things*. In the second phase, the emphasis has shifted to *doing things*. The most recent phase that is emerging now is *making things* - i.e. femtosecond manufacturing. All along, this field has been not only an outlet for creative energies, but also an engine for small business creation, and interdisciplinary education and training as well.

Photons and Photonics in the Information Age

Jozef Straus
JDS Uniphase (Canada)

An overview will be given of the product and technology advances of optical components and modules for a variety of networking applications. Discussion will focus on addressing the customer's need for solutions that meet the economics of today's systems and the technical requirements for the next generation.

Photonic Band Gap Materials: a Semiconductor for Light

Dr. Sajeev John
Department of Physics
University of Toronto

The electronics revolution of the 20th century has been made possible through the ability of semiconductors to microscopically manipulate the flow of electrons. Many scientists around the world have suggested that the 21st century will be the Age of Photonics, in which artificial materials are synthesized to microscopically mould the flow of laser light. Photonic Band Gap (PBG) materials provide a versatile new platform for this to take place. Unlike semiconductors which facilitate the coherent propagation of electrons, PBG materials execute their novel functions through the coherent trapping or localization of photons. This has important consequences in basic science. It may also be important for the optical communications industry. I review and discuss some of the key developments in the field of PBG materials over the past 15 years and suggest how they may impact us in the near future.

Photosensitivity in Optical Waveguides: Technology and Applications

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When ultraviolet light radiates an optical fiber, the refractive index of the fiber is changed permanently; the effect is termed *"photosensitivity"*. The change in refractive index is permanent in the sense that it will last for several years (life times of 25 years are predicted) if the optical waveguide after exposure is annealed appropriately; that is by heating for a few hours at a temperature of 50°C above its maximum anticipated operating temperature.

The photosensitivity of Germanium-doped-core optical fibers was discovered more than twenty years ago. The discovery provided a means for photoimprinting Bragg gratings in the core of optical fibers, and eventually photosensitivity became an important technology for fiber optic communications. Initially, photosensitivity was thought to be a phenomenon associated only with germanium-doped-core optical fibers. Subsequently photosensitivity has been observed in a wide variety of different fibers, many of which do not contain germanium as waveguide core dopant. Nevertheless, optical fiber with a germanium-doped core remains the most important material for the fabrication of Bragg-grating-based devices. This paper recounts briefly the story of optical-waveguide photosensitivity and describes some of the devices that can be implemented by its use.