

Papers Published in Technical Journals and Conference Proceedings

Double-branched 1×29 Silica-based PLC Switch with Low Loss and Low Power Consumption

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Proc. of the 17th Microoptics Conference (MOC'11), Sendai, Japan, 2011.

We propose a novel double-branched circuit configuration for a 1×N optical switch. This compact configuration offers a high port count without greatly increasing power consumption. The fabricated 4-arrayed 1×29 silica-based PLC (planar lightwave circuit) switch exhibits an insertion loss as low as 2.6 dB.

Liquid Deposition Patterning of Conducting Polymer Ink onto Hard and Soft Flexible Substrates via Dip-Pen Nanolithography

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Langmuir, American Chemical Society, Vol. 28, No. 1, pp. 804–811, 2012.

Ink formulations and protocols that enable the deposition and patterning of a conducting polymer (poly(3,4-ethylenedioxythiophene) poly(styrenesulfonate) or PEDOT:PSS for short) in the nanoscale domain have been developed. Significantly, we demonstrated the ability to pattern onto soft substrates such as silicone gum and polyethylene terephthalate (PET), which are materials of interest for low cost, flexible electronics. The deposition process and dimensions of the polymer patterns were found to be critically dependent on several parameters, including the pen design, ink properties, time after inking the pen, dwell time of the pen on the surface, and the nature of the material substrate. By assessing these different parameters, we obtained an improved understanding of the ability to control the dimensions of individual PEDOT:PSS structures down to 600 nm in width and 10–80 nm in height within patterned arrays. This applicability of dip-pen nanolithography for simple and nonreactive liquid deposition patterning of conducting polymers could lead to the fabrication of organic nanoelectronics or biosensors and complement existing printing techniques such as inkjet and extrusion printing by scaling down conductive components to submicrometer and nanoscale dimensions.

Compact Wavelength Tunable Filters Fabricated on a PLC Chip that Construct a Colorless/Directionless/Contentionless Drop Function in an Optical Cross-Connect

T. Niwa, R. Hirako, H. Hasegawa, K. Sato, M. Okuno, and T. Watanabe

Proc. of the Optical Fiber Communication Conference (OFC), p. OTh3D.6, Los Angeles, USA, 2012.

We demonstrate an efficient colorless/directionless/contentionless add/drop configuration utilizing newly proposed tunable filters to develop flexible optical cross connects (OXC) and reconfigurable optical add-drop multiplexers (ROADMs). The filters were compactly fabricated on a 15×70 mm² PLC (planar lightwave circuit) chip and the performance was verified.

Silica-based PLC Transponder Aggregators for Colorless, Directionless, and Contentionless ROADM

T. Watanabe, K. Suzuki, and T. Takahashi

Proc. of the Optical Fiber Communication Conference (OFC), p. OTh3D.1, Los Angeles, USA, 2012.

We describe a silica-on-silicon PLC (planar lightwave circuit) transponder aggregator based on a splitter-switch architecture. This integrated aggregator enables us to make a colorless, directionless, and contentionless multidegree reconfigurable optical add-drop multiplexer (ROADM) cost-effectively with a small footprint.

Constructing a Class-Based Lexical Dictionary using Interactive Topic Models

K. Sadamitsu, K. Saito, K. Imamura, and Y. Matsuo

Proc. of the 8th International Conference on Language Resources and Evaluation (LREC), pp. 2590–2595, Istanbul, Turkey, 2012.

This paper proposes a method of constructing arbitrary class-based related word dictionaries on interactive topic models; we assume that each class is described by a topic. We propose a semi-supervised method that uses the simplest topic model yielded by the standard EM (expectation maximization) algorithm; model calculation is very rapid. Furthermore, our approach allows a dictionary to be modified interactively and the final dictionary has a hierarchical structure.

This paper makes three contributions. First, we propose a word-based semi-supervised topic model. Second, we apply the semi-supervised topic model to interactive learning; this approach is called the Interactive Topic Model. Third, we propose a score function; it extracts related words that occupy the middle layer of the hierarchical structure. Experiments showed that our method can appropriately retrieve the words belonging to an arbitrary class.

Suppression of Polarization Dependence of Gain in Distributed Raman Amplifier System with Compact Pump Depolarizer

H. Kawakami, K. Mori, H. Yamamoto, and H. Miyamoto

Proc. of the 10th International Conference on Optical Internet (COIN2012), Vol. TuF3, Yokohama, Japan.

This paper tackles the polarization dependence of gain (PDG) in a distributed Raman amplifier system with orthogonal polarization multiplexed pump lights. We show that polarization mode dispersion in a transmission line degrades the orthogonality of pump lights and induces PDG. We propose a compact pump depolarizer to suppress PDG.

Hardware implemented network time protocol (HwNTP) based synchronization for digitized radio over fiber systems

S. Kuwano, Y. Yamada, K. Hisadome, and M. Teshima

IEICE Communications Express, Vol. 1, No. 1, pp. 4–9, 2012.

This paper reports on the synchronization performance of a hardware implemented network time protocol (HwNTP) module for a digitized radio over fiber (DROF) system. In experiments, the

HwNTP client was synchronized with the HwNTP server via an asynchronous packet network, and it provided highly accurate time and frequency references compared with software-based NTP. The accuracy achieved for a commercial Ethernet service is sufficient to satisfy the DROF requirements.

**Quantum repeaters and computation by a single module:
Remote nondestructive parity measurement**

K. Azuma, H. Takeda, M. Koashi, and N. Imoto

Physical Review A, Vol. 85, 062309, 2012.

We introduce a simple photonic probing scheme of remote nondestructive parity measurement (RNPM) on a pair of matter qubits. The protocol works as a single module for key operations such as entanglement generation, Bell measurement, and parity check measurement, which are sufficient not only for working toward a quantum repeater but also for equipping it with entanglement distillation. Moreover, the RNPM protocol can also be used for generating cluster states toward measurement-based quantum computation.
