OpTech-Net e.V. – Network for Optical and Optoelectronic Technologies and Systems (Nordrhein-Westfalen)

Kompetenznetz Optische Technologien

Objectives

The goal of the network is to support and promote optical and optoelectronic technologies. OpTech-Net e.V. functions as a

- communications platform for advancing strategic cooperative ventures
- broker, initiator and coordinator of new projects and alliances between the scientific and business communities, with the aim of accelerating the time-to-market of innovative products through networking.

Members of the network

- 23 SMEs
- 2 major corporations
- 2 research institutes
- 7 universities
- 4 private individuals

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www.optech-net.de

www.kompetenznetze.de/optech-net-en

Focus of activities

Optical technologies as a whole represent the key technology of the 21st century. Though regionally anchored, OpTech-Net is a nationally active association for linking business, science and education communities in this field. The ongoing activities that facilitate the exchange of ideas and information between these three areas include:

- Networking
- Initiation of cooperative ventures
- Knowledge transfer
- Specialist group activities
- Technology marketing
- Public relations

The network derives its focal areas of professional specialization from members' fields of activity. These areas are currently:

- Optical communications technology
- Display, signaling and lighting technology
- Sensors and metrology
- Optics, micro-optics and assembly and interconnection technology
- Materials
- LED technology

International activities

OpTech-Net e.V. is a member of the International Coalition of Optoelectronics Industry Associations (ICOIA), in which 10 optical and optoelectronics industry networks from around the world have banded together for the purpose of regularly discussing developments and trends in the field.
The Competence Network also participates in the community exhibition stands set up each year by Optecnet Deutschland e.V. at the Photonics West trade show in the USA, which gives member companies of the various Competence Networks the opportunity to present their products and break into new markets.

Projects

The members of the network participate in a variety of collaborative projects. The venture described below, an EU-funded collaborative project in the area of optical communications technology involving two members and two foreign partners, serves as one example:

Optical phase shift keying with synchronous demodulation

Since July 2004, a project jointly conducted by the *University of Paderborn* and three companies – CeLight in Israel, Photline Technologies in Besançon, France and *Innovative Processing AG (IPAG)* in Duisburg, Germany – has been operating with support from the European Commission within the scope of the Sixth Framework Programme. With a total of 1.7 million euros in funding through to June 2007, the project aims to develop "Key Components for Synchronous Optical Quadrature Phase Shift Keying Transmission".

This innovative modulation/demodulation scheme – given the abbreviated project designation "synQPSK" – can be combined with additional polarization multiplexing to achieve four times the information capacity of conventional data transmission methods. Existing wavelength multiplex systems, designed for channel data rates of 10 Gbit/s, can be set up for 40 Gb/s per channel using this approach. Specific advantages over 40 Gb/s time multiplex transmission are increased tolerances as compared with chromatic dispersion and polarization mode dispersion, and higher receiver sensitivity, which makes it possible to use existing fiber-optic cables and optical amplifiers, along with the rest of the system. Additionally, the frequency selectivity inherent in this method allows tighter packing of wavelength multiplex channels, thus permitting a further increase in transmission capacity.

Figure: The first electronic LED media facade to be installed can be seen at T-Mobile in Bonn (Germany)

From a technical standpoint, this project requires an optical super-heterodyne receiver in which a local laser is used for down-converting the optical fields into the baseband. Whereas earlier synQPSK work required highly specialized lasers with linewidths in the lower kHz range, the current project aims to achieve synQPSK using standard DFB lasers. The most significant project developments will be a QPSK modulator, an optical 90° hybrid co-packaged with balanced photoreceivers, SiGe and CMOS microelectronic circuits for processing the signals received, and a 4x10.7-Gb/s test bed for validating these components.

It is hoped that synQPSK technology will facilitate further growth in data transmission capacity that is both evolutionary and, compared with other strategies, more economical.
http://ont.upb.de/synQPSK/

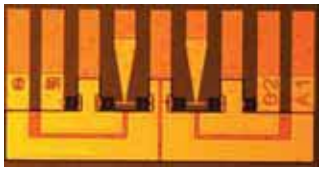
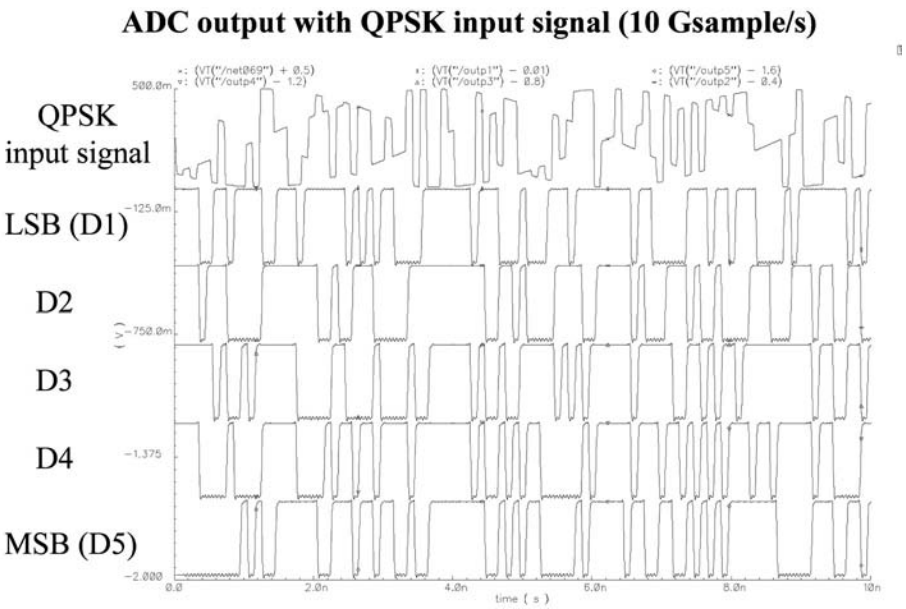


Figure: Realised component for synQPSK transmission.

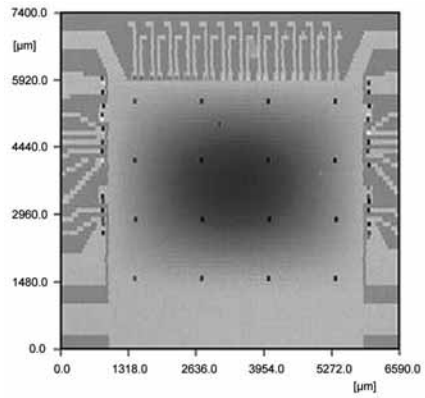


Innovation highlights

Highlight 1
Transparent LED media facade
The Lumino LED media facade combines normally incongruous elements in a way that distinguishes it from any other LED display system in the world.
It is the first full-color, video-capable outdoor facade display that neither alters the building's architecture nor compromises the view from within the building or from without. The scale, form and contour of the LED media facade can be customized for individual needs. The presentation design possibilities are virtually endless.
www.lumino.de

Highlight 2
Gross and fine leak testing at the wafer level for hermetically encapsulated MEMS devices
MEMS devices and many types of electronic and photonic components require the protection of hermetic packaging to ensure reliability. Leak testing for small form factor modules has traditionally been very challenging from a technological standpoint, as well as cost-intensive. The new patented Optical Leak Test Station makes it possible to conduct gross and fine leak testing in a single pass for a full wafer with encapsulated devices and to identify leaks for each individual package on the wafer. A small membrane is integrated on each package – an optical sensor measures the deflection of the membrane as a function of time and pressure to detect potential leaks.
www.nanofocus.de
www.hymite.com

Figure: Membrane deflection indicates that the package has no gross leaks.



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