

FIREFLY - New EU project in the area of Photonic Integrated Circuits

21 November 2011

On 20 and 21 October 2011 the kick off a new project in the area of photonics took place. TNO took the initiative to start the FIREFLY consortium together with partners from the industry, IBM Research, Tyco Electronics Netherlands, VERTILAS and Momentive as well as research groups from IMEC, VTT, Tyndall and the University of Utrecht. The main goal of the project is to develop new optical components which will make it possible to transmit data over short distances. With these new components, the data transmission in computers can become much faster than with the electronic components currently used.

Within companies, but also at home, people want to communicate more and more, and faster and faster. This growing bandwidth demand is related to an increasing number of communication hungry applications such as data sharing. Overall system performance has to increase accordingly, driving communication at all interconnect levels. Compared to electrical communication, optical data transfer offers several advantages in terms of propagation loss and bandwidth-length product. This led to the introduction of optical data transmission (e.g. glass fibre) as a replacement of electronic data transmission (e.g. copper wire) in most transmission applications longer than 100 meters. In addition, a need arises *for optical data transmission inside the computer, eliminating the electrical interconnect bottlenecks and bridging ever shorter distances using optics.*

The vision of IBM regarding this issue is illustrated in figure 1.

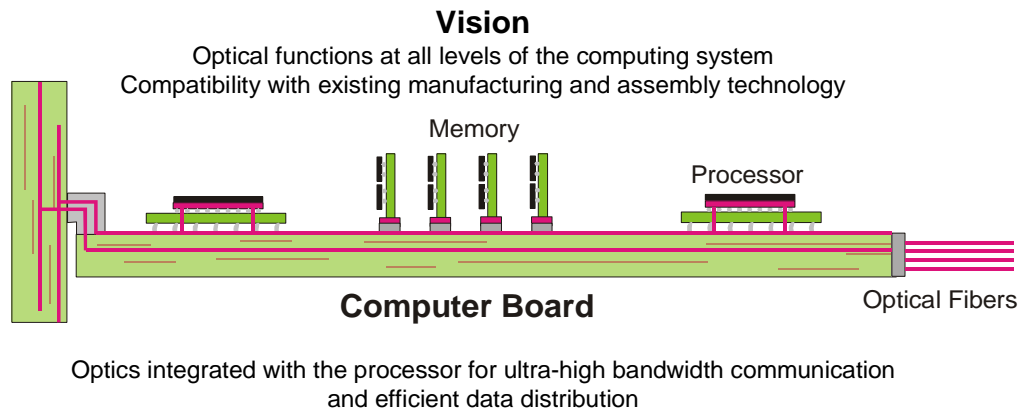


Figure 1: Illustration of optical interconnects on a printed circuit board (PCB) shown by the pink lines.

Source: IBM Research GmbH.

This need led to idea to combine forces from materials, processing and components expertise to build the project FIREFLY: “Multilayer Photonic Circuits made by Nano-Imprinting of Waveguides and Photonic Crystals”.

Innovative polymers, new applications of nano-technology as well as new methods for light in- and out coupling and the integration of all these new components are the technical ingredients of this ambitious project.

An illustration of the concept aimed for, is shown in the figure 2.

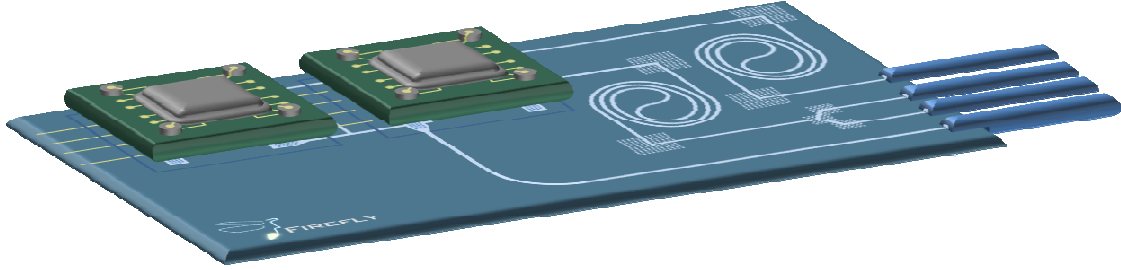


Figure 2: Example of Board level Photonic Integrated Circuit.

Two processors including communication with Vertical-cavity surface-emitting lasers (VCSELs) to the optical board below them.

Partner contributions

Besides the role of coordinator, TNO will take part in the materials development, create a method to make photonic crystals for light guiding and prepare imprint moulds for the manufacturing of the nanostructures. More details about the project are presented on www.fp7-firefly.eu.

FIREFLY is sponsored by the FP7 ICT program of the European Commission.