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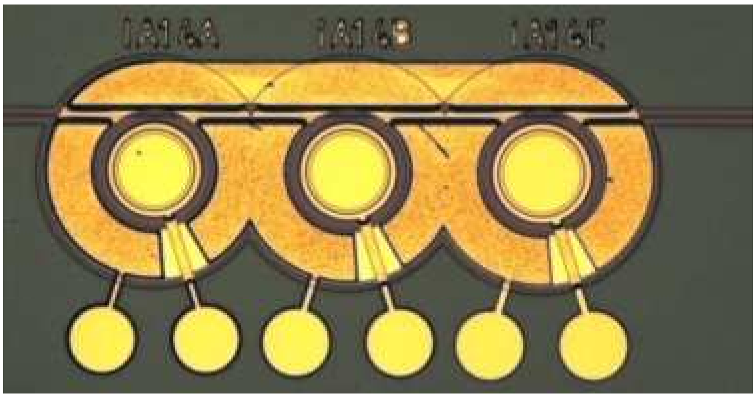
NEWS

Jan 16, 2008

Euro project claims micro-ring laser firsts

A Germany-led collaboration shows how to use a GaAs transfer wafer to help fabricate complex InP chips that feature three monolithically connected microring lasers.



by Andy Extance

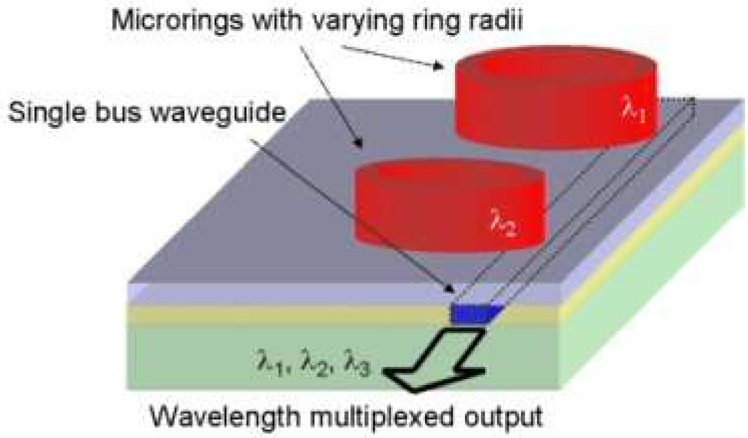
High speed networking could soon benefit from even more compact InP components, thanks to a European research program's recently developed chip fabrication technique.

The WAPITI collaboration has used a specially-developed wafer bonding approach to produce extremely compact wavelength-division-multiplexing (WDM) transmitters and multiplexers for optical communications, it claims.

The €2.1 million ($3.2 million) project specifically exploits microring laser technology, and WAPITI's approach has also allowed the first demonstration of a wavelength multiplexed ring resonator monolithic transceiver.

Although WAPITI (Wafer Bonding and Active Passive Integration Technology and Implementation) officially finished in September 2007, project leader Helmut Heidrich says these demonstration experiments have only been performed within the past month.

The collaboration has made 900 µm x 400 µm chips, upon which sit three microrings, with radii increasing from 50 to 60 µm. In comparison InP array wave grating multiplexers are millimeters in length, and the silicon variety comes in centimeter dimensions.

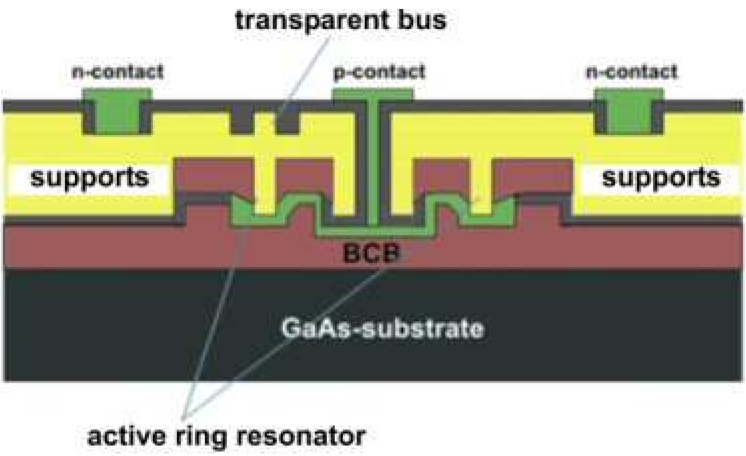


The output power from the WAPITI components is currently below 0.1 mW, but Heidrich says this should be enough for short-range transmission at 10 Gb/s data rates and is potentially able to reach 100 Gb/s.

“We see two fields of applications for these microrings, low output power WDM sources for short-reach data links, and for exploitation of non-linear phenomena,” Heidrich told compoundsemiconductor.net.

A second European microring laser project called IOLOS that is looking to explore the non-linear phenomena for all-optical computing purposes is ongoing, and scheduled to run until the end of 2009 (see related story).

The WAPITI fabrication method involves the epitaxial growth of waveguide, spacer and laser layer stacks on an InP substrate, before attaching the structured upper laser layers to a GaAs transfer wafer using benzocyclabutadiene (BCB). The original InP substrate is then chemically etched down to the waveguide layer before further processing.



The advantage of the technique is that it allows multiple microrings to be integrated onto a single transparent optical waveguide, enabling optical multiplexing. Microrings with different radii produce different wavelengths of light, which can each carry different data streams within a multiplexing protocol.

Heidrich, who has worked for 25 years as a project manager at the Berlin-based Heinrich-Hertz Institute, is now hoping to secure funding to follow up the 40-month WAPITI project.

Other research institutions participating in the project include the University of Cambridge, the University of Athens, the German Max-Planck Institute of Microstructure Physics and the Romanian National Insitute for R&D in Microtechnologies in Bucharest. Industrial partner EV Group also adds further wafer processing expertise and equipment to the project team.

About the author

Andy Extance is a reporter at compoundsemiconductor.net.