

Technology Offer

Small-sized electro-absorption modulator enabling improved optical communications inside electronic devices

Summary

A Slovenian – Swiss – Italian R&D organization consortium has developed an electro-absorption modulator (EAM) for use in telecommunications and optical/photonics integrated circuits. Due to its smaller size the device allows for improved signal transmission and is cheaper to produce compared to known EAMs. Industrial partners interested in license agreements, technical cooperation agreements, and/or research cooperation agreements, are sought.

Creation Date	23 February 2016
Last Update	08 March 2016
Expiration Date	08 March 2017
Reference	TOSI20160223001

Details

Description

Electro-absorption modulators (EAMs) are candidates for use in external modulation links in telecommunications and internal links on integrated circuits of photonic and electronic devices. Compared to existing modulation systems, EAMs operate at 10-times lower voltages, generate less heat, and enable faster signal transmission.

Slovenian, Swiss and Italian researchers have developed an EAM based on a semiconductor material with exceptionally strong light-matter interaction. The device consists of an ultrathin (few nm) semiconductor film that is sandwiched between two transparent electrodes and whose transmission is modulated by the applied voltage between the two electrodes. A transverse electric field is applied via the electrodes. The device may be inserted directly into the light path (preferentially with the semiconductor film perpendicular to the light path) or cladding a waveguide (as in current electroabsorption modulator technology) to modulate the evanescent wave. Various embodiments and geometries were developed that achieve a significant light modulation on an unprecedentedly short optical path.

EAMs presented here are due to their small size more applicable in future electronic devices (e.g. desktops, mobile phones, modems, routers etc.) in which conventional electronic integrated circuits will be replaced by photonic circuits capable of faster, more energy efficient data transmission.

Since the technology aims to reach its full potential in an industrial setting wherever precise EAMs are needed, industrial partners are sought. The technology is in the field of finer mechanics, therefore technical cooperation is sought in order to facilitate continuous

development rather than just routine production, and to validate the technology in an industrial setting. License agreements and / or agreements for research / technical cooperation will enable the researchers to maintain their focus on the research behind the technology whereas validation will be carried out in the industrial partner's setting. The possibility of joint applications to EU calls are not excluded.

The researchers involved in development of this EAM technology work on nanoelectronics and investigate electrical properties, fundamental physics and practical applications of nanomaterials, from their growth to incorporating them into devices and performing electrical, optical and nanomechanical characterization. Their research expands from fundamental science, mostly about photo excitation dynamics in low dimensional systems, to application in photonics and energy (polymeric and hybrid solar cells). New materials that promise new applications in the following highly competitive fields are of special interest: optical data storage, optical processing and telecommunications, especially in the form of integrated optics.

Advantages and Innovations

In addition to known advantages of EAMs (lower energy consumption, lower heat generation and faster signal transmission) the device presented here achieves a significant light modulation on an unprecedentedly short optical path. Hence, the size of device is significantly reduced as well as the consumption of semiconductor material for its production as compared to known EAMs.

Stage of Development

Under development/lab tested

Comments Regarding Stage of Development

Currently the technology has a low technology readiness level (TRL 3-4 – experimental proof of concept, validated in laboratory). The researchers have the knowledge for developing the technology to higher TRLs. Further development and investments by industrial partners are desired to increase the stage of development of this technology.

IPR Status

Secret Know-how, Patent(s) applied for but not yet granted

Comment Regarding IPR status

In addition to substantial amount of secret know-how related to the researchers' expertise, a patent application was filed in January 2016 covering the most important properties and principles of operation related to the device described here.

Profile Origin

H2020 – Excellent Science – Marie Skłodowska-Curie

Keywords

Technology

01002008	Optical Networks and Systems
01002012	Semiconductors
01003008	Data Processing / Data Interchange, Middleware
01006009	Signal Processing
05003002	Optics

Market

01004002	Data communication components
03001001	Semiconductors
03005	Laser Related
03006	Fibre Optics
08001010	Semiconductor materials (e.g. silicon wafers)

NACE

M.72.1.9	Other research and experimental development on natural sciences and engineering
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Network Contact

Issuing Partner

INSTITUT JOZEF STEFAN

Contact Person

Levin Pal

Phone Number

00386 1 477 3303

Email

levin.pal@ijs.si

Open for EOI : **Yes**

Dissemination

Send to Sector Group

ICT Industry and Services

Client

Type and Size of Organisation Behind the Profile

R&D Institution

Year Established

1946

Turnover

50 - 100M

Already Engaged in Trans-National Cooperation

Yes

Languages Spoken

English

Slovenian

Client Country

Slovenia

Partner Sought

Type and Role of Partner Sought

Industrial partners such as integrated device manufacturers, fabless manufacturers, foundries and others interested in license agreements, research cooperation agreements, and/or technical cooperation agreements for further development, in order to validate and demonstrate the technology in an industrially relevant environment. The possibility of joint application to EU calls is not excluded.

Type and Size of Partner Sought

SME 11-50, SME <10, >500 MNE, 251-500, SME 51-250, >500

Type of Partnership Considered

License agreement

Technical cooperation agreement

Research cooperation agreement