

## **Curriculum Vitae of Andrei Tsarev, Dr. Sci.**

Chief Scientist, Head of NanoPhotonics and Integrated Optics Group,

Laboratory of Optical Materials and Structures,

Rzhanov Institute of Semiconductor Physics SB RAS,

Lavrentiev av. 13, Novosibirsk, Russia, 630090

Web: <http://www.isp.nsc.ru/lab6/index.php/main>

E-mail: [tsarev@isp.nsc.ru](mailto:tsarev@isp.nsc.ru)

Combine job: Senior scientist,

Novosibirsk State University,

Laboratory of Semiconductor and Dielectric Materials

Pirogova Str. 2, Novosibirsk, Russia, 630090



Andrei (Andrey) Tsarev (M'77) was born in Kuybyshev, Russia, in April 1955. He received the Diploma degree in physics (M.S.) from Novosibirsk State University, Novosibirsk, Russia in 1977, and the Degree of Candidate of Sciences (Ph.D.) and the Doctor of Sciences degree from the Rzhanov Institute of Semiconductor Physics, Siberian Branch of Russian Academy of Sciences (ISP SB RAS), Novosibirsk, Russia in 1983 and 2008, respectively. Since 1977, he has been with the ISP SB RAS, where he is currently a Chief Scientist and the Head of NanoPhotonics and Integrated Optics Group of the Laboratory of Optical Materials and Structures. He has investigated propagation optical waves and its interaction with surface acoustic wave in semiconductor, inhomogeneous and anisotropic waveguide structures [1-10]. He has proposed and invented multi-splitting filtering technology [4] and has numerically studied its implementation for compact tunable devices (filters and reconfigurable optical add/drop multiplexers) on different materials (silicon-on-insulator (SOI), lithium niobate, etc.). These devices are intended for fiber-optic interrogation [5, 7] and flexible wavelength-division-multiplexing (WDM) fiber optical networks [3, 4, 8-10].

In the recent years, he has conducted intensive investigation in silicon photonics [3, 4]. He developed the modified effective index method (MIEM) [6] which simultaneously fit both the phase and the group indexes of 2D waveguide to the 3D initial silicon wire waveguide. MEIM drastically increase accuracy of 2D FDTD simulation of photonic structures. He proposes and investigates the wide single-mode heterogeneous [8, 9] and strip and grating-loaded waveguides on SOI, as well as efficient silicon wire waveguide crossing [3] with negligible loss and



crosstalk. The new SOI design is CMOS compatible and intended for implementation in multiple nano-phonic elements and the most preferable for development multi-splitting filtering devices for WDM and sensors. He proposed and numerically proved [1] the way to drastically decrease (up to 2.8 times at RF frequency 100 GHz) the tuning voltage of polymer EO modulator by implementing the additional insulating strips with the high dielectric permittivity. He had found the affect of abnormal blocking [2] of guided wave propagation in silicon wire by evanescence coupling with segmented periodic strips. This effect could find application in construction of rejecting filters and novel optical sensors.

He has a long history of successful cooperation with Politecnico di Bari, namely, with the Photonic research group of Prof. Vittorio M.N. Passaro, which results in 5 joint publications [4, 5, 8-10] and multiple conference presentations. Besides, he had conducted two original lecturing courses for Politecnico di Bari, Italy: "Acoustooptic devices" (24-hours, September 2004) and "Acoustooptic interaction in anisotropic and semiconductor waveguides" (20-hours, December 1999) as well as he had presented multiple lectures related to state of art his research during his previous visits to Politecnico di Bari, Italy (2014, 2011, 2008, 2007) for the scientific collaboration. Since 2017 he is invited to be a member of Doctorate Board in Electrical and Information Engineering of Politecnico di Bari.

Among the best active working Russian scientist Dr.A.Tsarev was invited by Novosibirsk State University, Russia to combine his research both in the host Institute and in the University, and, besides, he was invited to conduct the original course "Silicon Photonics" for the new Master's Program in English language «Quantum optics and Nanosciences» ([http://www.nsu.ru/quantum\\_optics\\_nanoscience](http://www.nsu.ru/quantum_optics_nanoscience)) in Novosibirsk State University (will starts at 2017/2018 academic year). He had published about 100 scientific papers (including 16 Scopus publications, since 2102, see Author ID: 7004023802), 3 book chapters as well as three U.S. and three Russian patents. He is a member IEEE/Photonics (1977).

### **Main publications of Andrei Tsarev**

1. Andrei Tsarev, Rinat Taziev, Evan Heller, Maryvonne Chalony, "Polymer electro-optic modulator efficiency enhancement by the high permittivity dielectric strips," *Photonics and Nanostructures - Fundamentals and Applications*, 25, pp. 31-37 (2017).
2. E A Kolosovskii, A V Tsarev, "Abnormal blocking of a guided mode propagating in a silicon optical waveguide with periodic tunnel coupling", *QUANTUM ELECTRON*, 2017, 47 (1), pp. 58–64.
3. A. Tsarev, "Numerical Modeling of the Optical Multiplexer on SOI Constructed by Multiple Coupled Waveguides," *IEEE Journal of Selected Topics in Quantum Electronics*, vol.20, no.4, pp.77-84, July-Aug. 2014.
4. Liam O'Faolain and Andrei Tsarev, "Experimental demonstration of original optical filter based on multiply coupled waveguides," *Opt. Lett.* 39, 3627-3629 (2014)
5. V. M. N. Passaro, A. V. Tsarev, and F. De Leonardis, "Wavelength Interrogator for Optical Sensors Based on a Novel Thermo-Optic Tunable Filter in SOI", *IEEE JOURNAL OF LIGHTWAVE TECHNOLOGY*, Vol.13, No 13, pp. 2143-2150 (2012).
6. Andrei Tsarev, "Modified effective index method to fit the phase and group index of 3D photonic wire waveguide," *Opt. Lett.* 38, 293-295 (2013).
7. A. V. Tsarev, F. De Leonardis, and V. M. N. Passaro, "Compact interrogator for fiber optic Bragg sensors based on an acousto-optic filter formed by photonic crystal rows of air holes," *Opt. Lett.* 36, 3756-3758 (2011).
8. A. V. Tsarev, F. De Leonardis, and V. M. Passaro, "Thin heterogeneous SOI waveguides for thermo-optical tuning and filtering," *Opt. Express*, 16, 3101-3113 (2008).
9. Francesco De Leonardis, Andrei V. Tsarev, Vittorio M. Passaro, "Optical properties of new wide heterogeneous waveguides with thermo optical shifters", *Optics Express* Vol. 16, Iss. 26, pp. 21333–21338 (2008).
10. Vittorio M. N. Passaro, Francesca Magno, Andrei V. Tsarev, Investigation of thermo-optic effect and multi-reflector tunable filter/multiplexer in SOI waveguides, *Optics Express*, Vol. 13, Issue 9, Page 3429-3437 (May 2005).