

2nd International Conference and Exhibition on Lasers, Optics & Photonics

September 08-10, 2014 Hilton Philadelphia Airport, USA

Modelling of emission from multilayer MQW spin-polarized diodes and lasers

Tibor Fordos^{1,2}, Kamil Postava¹, Henri Jaffrès², Jean-Marie George² and Jaromír Pištorá¹

¹Technical University of Ostrava, Czech Republic

²Université Paris-Sud 11, France

Spin-polarized light sources such as the spin-polarized light-emitting diodes (spin-LEDs) and spin-polarized lasers (spin-lasers) are perspective devices in which the radiative recombination of spin-polarized carriers results in emission of circularly polarized photons. The main goal our work is modelling of polarization properties of emitted radiation from spin-LED and spin-controlled vertical-cavity surface-emitting laser (spin-VCSEL) structures. A new approach based on 4×4 transfer and scattering matrix formalism (i) describes general polarization of emitted photons related to the quantum optical selection rules and consider spin polarization of injected current or generally polarized optical pumping field, (ii) describes the propagation of emitted field in general anisotropic multilayer system consisting of strained semiconductor quantum wells and magnetooptically active spin injector, and (iii) correctly defines phases of incoherent spontaneous emission and coherent stimulated emission and consequently has possibility to describe complete polarization state of emitted field including degree of polarization.

Biography

Tibor Fordos received his Master's degree with honours from Department of Physics and Nanotechnology Centre, Technical University of Ostrava, Czech Republic, in 2013. He is currently a PhD candidate working under the guidance of Dr. Kamil Postava (TU Ostrava, Czech Republic) and Dr. Henri Jaffrès (Unité Mixte de Physique CNRS and University of Paris XI, France). His research interests include magneto-optics, optical waves propagation in anisotropic multilayer structures, mathematical modelling of optical and magneto-optical effects, semiconductor spintronics, and spin-controlled lasers and diodes. He is the main investigator of Student Grant Award 2014 (SP2014/84, Ministry of Education, Czech Republic) and has published 3 scientific papers.

tibor.fordos@gmail.com