Electro-Optics/Physics Seminar
Tuesday, February 11, 2014
11:00am CPC 580
All are invited

Prof. Igor Melnikov
Photonics Lab, Nat'l Research Univ of Elect Tech, Zelenograd
Laboratory of Optical Physics and Engineering, U of Illinois

Aluminum Oxide as a Self-Organizing Template for Heterogenous Photonic Crystals

Abstract

In this talk, heterogeneous photonic crystals are presented that are made of group II-oxides, sulfides, and selenideselectrochemically deposited in the template of a self-organizing porous aluminum oxide. The self-organization approach to nano-structured materials and templates looks like a much simpler and, hence, cheaper technological alternative to lithography-based ones. The self-organization here might be due to an ion bombardment, arc-discharge evaporation, laser ablation etc. The main disadvantage of this approach is the far-order produced that might be as low as a few spatial periods. Easy parameter adjustment pertinent to electrochemical procedures enables us to produce arrays of porous materials with substantially higher levels of the far-order. We make use of the method of the aluminum anodizing in order to produce nano-structures in the form of the ordered array (template) of hexagons that have a nanopore in the center. In the next step, the precursor of an AII metal is immersed into these pores by means of vacuum or electrochemical deposition technique. Subsequent oxidation, sulfidization, or selenidizationsynthesizes photonic crystals with controllable morphology and optical properties.

Speaker Bio

Prof. Igor Melnikov is at present a Head of the Photonics Lab of the National Research University of Electronic Technology in Zelenograd, Moscow, Russia, and Adjunct Professor in the Laboratory of Optical Physics and Engineering of the University of Illinois in Urbana-Champaign. He also serves as a Consultant to a number of photonics companies in Russia, Canada, and Hong-Kong. He has 25 years of experience in many aspects of photonics and has pioneered a number of developments in chemical lasers, optical memory devices with random access, fiber optics, multiple-wavelength lasers, few-cycle optical pulses, metallo-dielectric layered nano-magnetics, and resonance photonic crystals. The resonance photonic crystal research he has undertaken in Toronto as a Visiting Professor of the University of Toronto, has been recognized by a whole series of invited and plenary talks at meetings and seminars across the North America and Europe, and has, along with his research on high repetition rate diode-pumped fiber lasers, generated a great deal of fundamental research and cutting-edge innovations in the photonics industry. He has been an author/co-author of over 100 papers, participated in prestigious meetings on Quantum Electronics and Photonics around the world, and has given seminars throughout the Western Europe and North America. His contributions in the field of photonics has been recognized by several awards in Canada, China, France, Germany, Mexico, UK, and the USA.