

5th International Conference and Exhibition on

LASERS, OPTICS & PHOTONICS

November 28-30, 2016 Atlanta, USA



Maria Tchernycheva

Université Paris Sud XI, France

Flexible optoelectronic devices based on inorganic nanowires

Photronics multiannual strategic roadmap 2014-2020” mentions flexible electronics, flexible light sources, displays and solar cells as key emerging technologies with high expected growth of the market share. Indeed, flexible devices offer new functionalities inaccessible with conventional technologies (e.g., rollable screens, bendable or implantable light sources, energy harvesters integrated in clothing, etc.) It is noteworthy that in the above-mentioned roadmap the notion of a flexible device is inseparable from an organic device. Technologies based on organic semiconductors have indeed made a huge progress in the past 10 years; however, organic devices still suffer from a short lifetime and low efficacy as compared to their inorganic counterparts. Taking an example of light emitting diodes (LEDs), organic LEDs suffer from strong degradation in the blue spectral range and their luminance at high current is low. Blue LEDs based on nitride semiconductors reveal high brightness and efficiency, yet conventional thin films represent rigid structures, which make fabrication of flexible devices rather difficult. In this context, nanowires offer an elegant solution to the problem. Single nanowires and nanowire array LEDs based on InGaN/GaN core/shell heterostructures have been successfully demonstrated on rigid substrates, showing excellent performances in the blue spectral range, thanks to their high crystalline quality and non-polar active region. I will present our recent work on nitride nanowire-based light emitters and photodetectors. These nanomaterials have the potential to boost the device performance, improve energy efficiency, reduce the cost, and bring new functionalities. In particular, I will discuss our recent progress towards flexible nitride nanowire devices: we propose a method to combine high flexibility of polymer films with high quantum efficiency provided by nitride nanowires to achieve flexible inorganic LEDs and light sensors.

Biography

Maria Tchernycheva is an Engineer from Ecole Polytechnique (X98). She has received PhD in Physics from the Université Paris Sud, Orsay (France) in 2005. In the year 2005, she joined the Laboratory for Photonics and Nanostructures, CNRS, Marcoussis, France as a Post-doctoral Researcher. Her work was focused on the fabrication of III-V and III-N semiconductor nanowires by molecular beam epitaxy. In 2006, she joined CNRS at the Institut d'Electronique Fondamentale of University Paris-Sud in Orsay where she is currently leading the “NanoPhotoNit” Research Group focusing on the fabrication and testing of novel optoelectronic devices based on semiconductor nanowires. She has published more than 100 articles in international journals, which gathered more than 2000 citations (her Hirsh index is 32). She received the Madeleine Lecoq award from the French Academy of Sciences in 2006.

maria.tchernycheva@u-psud.fr

Notes: