

Nanoscale light control for sensor applications and photonics

A Seminar of the IEEE WA joint EDS/SSCS/IPS Chapter

Professor Saulius Juodkazis

Centre for Micro-Photonics, Swinburne University of Technology, Melbourne
Melbourne Centre for Nanofabrication, Clayton

Monday, 10 July 2017 @ 1.00 PM

**Venue: Billings Room 3.04, 3rd floor. Electrical & Electronic Engineering Building
University of Western Australia, Crawley**

This seminar is open to the public and admission is free to all IEEE members and non-members

Abstract:

Future light-based technologies will have strong presence in high precision nano-/micro-fabrication and sensors. For light-matter interactions occurring on atomic and molecular level we still need to develop better tools to control light at nanoscale via nano-fabrication and manipulation of nano-objects. In this talk our recent advances in high precision nanofabrication using 3D approaches and combining standard cleanroom tools with laser direct writing capabilities will be presented.

Combination of electron beam lithography (EBL) with post-processing of nanoparticles with Ga-ion milling opens a possibility of sub-20 nm direct write of nano-inscriptions on nanoparticles. Arrays of identical nanoparticles were fabricated with high fidelity and with uniform nano-features. This approach was key to make chiral plasmonic nanoparticles which show strong optical dichroism and can be used for optically driven motors and nano-tweezers. Controlled resizing of ion-milled nanopores over the range of sizes from 100 nm to several nanometres in nano-membranes is achieved using electron beam scanning.

Surface charging which is a common problem in applications of ion milling and electron imaging is resolved with co-illumination of deep UV light whose photons have energy larger than the electron work function for a given material. EBL and IBL can be both optimized for a high throughput for simple sample geometries. 3D laser fabrication of micro-optical elements and nano-textured surfaces adds new applications in lab-on-chip and sensing.

Biography:

Professor Saulius Juodkazis obtained his PhD 1997 from Vilnius University, Lithuania and Lyon-I University, France. He is currently investigating peculiarities of light-matter interaction in small space and time domains (sub-wavelength and sub-1 ps) for light harvesting, control and sensing applications. He set up and directs a nanotechnology cleanroom facility in 2012 at Swinburne which hosts 10 nm resolution electron and ion lithography, plasma deposition and etching tools with an ultra-short laser processing setup all capable of 3D nano-micro-structuring of materials. He is Fellow of OSA and SPIE.

