Plasmonic nanoparticles for femtosecond laser nanosurgery and diagnosis in nanomedicine

Michel Meunier
Professor in Engineering physics and biomedical Engineering
Head of the Engineering Physics Department
Polytechnique Montréal

Abstract

Plasmonic nanoparticles such as gold, silver or their alloys are interesting nanomaterials for their applications in nanomedicine. In this presentation, I will present recent developments in this field at Polytechnique. A new method for delivering exogenous biomolecules into targeted cells using a femtosecond laser and plasmonic nanoparticles will be presented. The technique of laser nanosurgery has been used to perform gene transfection in living cells, neuron stimulation and delivery of biomolecules in vivo for ophthalmic applications. Alloy nanoparticles have been synthesized and used to perform multiplexed 3D imaging of cells and tissues. Our techniques show promise of innovative tools for basic research in biology and medicine as well as effective alternative technologies that could be adapted to the therapeutic and diagnostic tools of the clinic.

Biography

A graduate of École Polytechnique de Montréal, Michel Meunier obtained a Bachelor's degree and a Master's degree in Engineering Physics in 1978 and 1980 respectively. He graduated in 1984 with a PhD in Materials Science from the Massachusetts Institute of Technology. In 1985, he began his career at École Polytechnique and he was promoted to full professor in 1993. Holder of a Canada Research Chair Tier 1 and co-founder of LTRIM Technologies, Michel Meunier is also a laureate, in 2006, of a Synergy Award for Innovation awarded by the Natural Sciences and Engineering Research Council of Canada. He is a Fellow of the Canadian Academy of Engineering, as well as OSA (Optical Society of America) and SPIE (International Society for Optics and Photonics). In 2016, Professor Meunier won the Guy Rocher Award for his excellence in teaching at the university level. His intense research activities focus on the development of new optical nanomaterials, nano-optical devices and laser technology for nanomedicine applications. He has published more than 380 articles and supervised more than 120 graduate students and postdoctoral fellows. Since June 1st 2019, he is the head of the Engineering Physics department.