The **EMNS** and **LCO** are pleased to invite you to the seminar:

Plasmonic nanoparticles and femtosecond laser for nanomedicine applications

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Date & Time: September 30, 2025, 13:00 – 14:00
Location: ULB-Solbosch, UD4.116, Room Michel Kaisin
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Plasmonic nanoparticles such as gold, silver, or their alloys are interesting nanomaterials for their therapeutic and diagnostic applications in nanomedicine. In this presentation, I will present recent developments in this field at Polytechnique:

Femtosecond laser nanosurgery: This new technology is based on the physicochemical phenomena occurring at the nanoscale during the interaction of a femtosecond laser pulse and a plasmonic nanostructure. The plasmon-mediated laser nanosurgery technique has been used to efficiently achieve gene transfection in various living cells and in vivo delivery of biomolecules in an animal model for ophthalmology applications. This technology has also been used to locally stimulate neurons to control neuronal activity and cell signaling. The physical mechanisms of the femtosecond laser and plasmonic nanoparticle interaction will be described.

Immunoplasmonics: Alloy nanoparticles were synthesized using an improved seeded-growth approach. The dielectric permittivity of these alloys was measured and modeled. These spectrally distinct plasmonic nanoparticles are used as biomarkers to perform quantitative multiplexed 3D imaging of cells and tissues. Different optical systems will be presented to clearly visualize these nanoparticles. This technology, called Immunoplasmonics, is used to improve cancer diagnosis. A spin-off company, Vega BioImaging, has been created to commercialize the technology.

Our techniques hold promise for innovative tools for basic research in biology and medicine, as well as effective alternative technologies that could be adapted to therapeutic, diagnostic, and theranostic tools in the clinic.

Biography

Michel Meunier received his PhD from MIT in 1984. In 1985, he began his career at Polytechnique Montréal and was promoted to full professor in 1993. Holder of a Tier 1 Canada Research Chair and co-founder of LTRIM Technologies, Michel Meunier is also the recipient of a 2006 Synergy Award for Innovation. He is a Fellow of the Canadian Academy of Engineering, as well as Optica and SPIE. In 2016, he won the Guy Rocher Award for excellence in university teaching. His intense research activities focus on the development of novel optical nanomaterials, nano-optical devices, and laser technologies for applications in nanomedicine. He has published over 400 articles and supervised over 120 graduate students and postdoctoral fellows. He is the co-founder of Vega BioImaging. He was Director of the Department of Engineering Physics from June 1, 2019 to June 1, 2021.

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