राष्ट्रीय प्रौद्योगिकी संस्थान हमीरपुर
हमीरपुर (हि॰प्र॰) – 177 005 (भारत)
NATIONAL INSTITUTE OF TECHNOLOGY HAMIRPUR
HAMIRPUR (H.P.) - 177 005 (INDIA)
(An Institute of National Importance under Ministry of HRD)

{DEPARTMENT OF CHEMISTRY}

Expert Lecture

NANO INTEGRATED BIO MICROSYSTEMS: SYNTHESIS AND APPLICATIONS INCLUDING CANCER DIAGNOSIS

By

Prof. M. PACKIRISAMY

Professor and Concordia Research Chair on Optical-Bio Microsystems
Optical Bio Microsystems Laboratory, Department of Mechanical Engineering
CONCORDIA University, Montreal, Canada

Nanometal-polymer composite films are hybrid materials with inorganic nanoparticles immobilized and uniformly dispersed into a polymer matrix. Nanoparticles such as gold and silver, used to enhance the optical properties of the polymers, are called `optically effective additives` as they lead to new functionalities of the polymer based materials. Au (Ag)-polymer and copolymer composite films are suitable for applications such as waveguides, color filters, thermo-chromic materials etc. The strong plasmon band of Au and Ag nanoparticles (Localized Surface Plasmon Resonance) in the visible spectrum, that originates from the excitation of plasmons by the incident light, makes noble metal-polymer nanocomposites particularly adequate for sensing and biosensing applications. Furthermore, association of Au and Ag nanoparticles of various shapes with poly(dimethyl siloxan) (PDMS), allows the use of nanocomposite materials for microfluidic biosensing as well.

In this presentation, we will talk about the *in-situ* synthesis of nano-PDMS nanocomposites both at the macroscale and inside the channel of a microfluidic chip. The nanocomposite has been successfully used for sensing of antibody-antigen interactions, allowing the detection of various important proteins. The effect of the particle`s shape on the properties of nanocomposites and their sensing abilities has also been studied by synthesizing nanostar particles and integrating them into microchannels. Because of the biocompatibility and non-toxicity of gold and silver nanoparticles, their nanocomposites can be used for plasmonic detection of biological entities in cancer research.

Prof. M. Packirisamy, a strong promoter of innovation in Canada in the area of Bio-Microsystems, is a Professor and *Concordia Research Chair on Optical-Bio-Microsystems* at Concordia University. As the Director of Micro-Nano-Bio Integration Center and Optical-Bio-Microsystems Lab, He studies nano integrated microsystems for cancer diagnosis to green energy harvesting, Lab on Chip, Bio-Microsystems and micro-nano integration. He is the recipient of *Member Royal Society of Canada College*, *Fellow National Academy of Inventors (US), Fellow Indian National Academy of Engineering, Fellow Engineering Institute of Canada, Fellow Canadian Academy of Engineering, Fellow American Society of Mechanical Engineers, Fellow Institution of Engineers India, Fellow Canadian Society for Mechanical Engineering* and *I.W.Smith award* from Canadian Society for Mechanical Engineering, *Concordia University Research Fellow*, *Petro Canada Young Innovator Award* and *ENCS Young Research Achievement Award*. As an author of around 450 articles published in journals and conference proceedings, 47invited talks, 30 inventions, obtained grants around $16Million and supervised more than 16 Research Associates/PDF, 31 PhDs, 54 Masters and 71 UG students in addition to teaching around 3000 students. He has also published a textbook, *BioMEMS: Engineering and Science Perspectives*, and 6 book chapters. His Recent invention on energy harvesting from *photosynthesis of blue green algae* had more than 300 citations around the world and was covered by most of the countries and media throughout the world.

Date and Time:
March 31st, 2022 (Thursday)
5:00 PM (Online)

Google Meet Link: https://meet.google.com/oqm-rzsu-utj