



# AVVISO DI SEMINARIO

Il giorno 16/06/2023 alle ore 11:00  
nell'aula seminari Grassano (Dip. di Fisica)

La Prof.ssa **MAHSHID Sara**

Terrà un seminario dal titolo

**“Translational Application of Nanostructured Biosensors: Diagnostics at the Point of Care”**

Proponenti: Prof. Francesco Ricci

Dott. Andrea Idili



# Translational Application of Nanostructured Biosensors: Diagnostics at the Point of Care

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## Abstract

Development of diagnostic devices with clinically relevant sensitivity and rapidity is highly desirable for decreasing the delay between diagnosis and treatment. Diagnostic inefficiency permeates multiple medical fields including infectious diseases and antimicrobial resistance (both recognized by WHO among paramount threats and research priorities). Molecular detection is also central to cancer, where therapies are often out of step with disease complexity and progression. The respective challenges may be addressed through the application of nanomaterial and high-throughput devices that offer unique advantages. In Mahshid Lab, we develop novel paradigms in point of care diagnosis via synergistically combining innovative nanostructured sensors with fluidic sample delivery systems and biomolecular assay capabilities (Nano/Bio diagnostic devices). From an engineering perspective, the lab seeks to use the remarkable intrinsic properties of novel nanomaterials, to render them capable of sensing the specific biomolecules. Such miniaturized sensors could be integrated with automated lab-chip devices and deployed to diagnose molecular changes in biological systems and in disease such as cancer (by targeting new cancer biomarkers) or to detect infectious agents in biological samples, e.g. in blood, saliva and urine. From a health industry perspective, we target the advancement of the automated and portable tools for in-field testing, remote locations and hospitals in close collaboration with clinicians to validate the devices with clinical samples. In particular and in the context of infectious disease, Mahshid lab has developed SALIVERA analogous to a qPCR, and NFluidEX analogous to a glucometer, that enabled rapid portable automated monitoring of SARS-CoV-2 infection in patient saliva and antibodies in patient blood, respectively. In the context of cancer, Mahshid lab has developed MoSERS, an on-chip approach for molecular profiling of extracellular vesicles (a new cancer biomarker) on-chip approach for molecular profiling of extracellular vesicles (a new cancer biomarker) in plasma and cerebrospinal fluid of glioblastoma patients. The proposed hybrid devices are capable of working with small sample volumes and precise dosing of reagents, enabling the transition to a portable diagnostic tool.

**Short Bio:** Dr. Mahshid is Canada Research Chair in Nano/biosensing devices and Assistant Professor of Bioengineering at McGill University. She is an associate member of the Division of Experimental Medicine in the Faculty of Medicine, and a full member of McGill Interdisciplinary Initiative in Infection and Immunity (MI4), Antimicrobial Resistance (AMR) Centre at McGill, McGill Sustainability Systems Initiative (MSSI) and Trottier Institute for Sustainability in Engineering and Design. Her Lab combines expertise in nanomaterials based biosensing, nano/ microfluidics and molecular diagnostics with strong focus on translational research. She is leading interdisciplinary projects between faculties of Engineering, Science and Medicine at McGill and McGill University Health Center (MUHC) and Jewish General Hospital in Montreal. She has over 60-journal paper publications in highly cited interdisciplinary journals including Nature Nanotechnology, ACS Nano, Advanced Science, Nano Letters, 6 US patents and over 40 invited or keynote presentations. Her lab innovations has received distinguished awards “McGill Innovation Fund (MIF)”, “William and Rhea Seath Awards in Engineering Innovation”, “MI4 Innovation Prize” and “TechAccel awards”, and has been recognized by accelerator programs in Montreal and Toronto such as “Centech”, “Engine”, “Lab 2 Market”, “Health Innovation Hub” and “Dobson Center for Entrepreneurship”. Her research has been featured by media outlets including McGill Newsroom, Radio Canada, Engineering Newsroom and MI4 Newsletter.