Professor Ahmed Lakhssassi

Ahmed Lakhssassi received the B.Eng. and M.Sc. in electrical engineering from Universite du Québec à Trois-Rivières (UQTR), Québec, Canada in 1988 and 1990, respectively. Received the Ph.D. in Energy and Materials Science from INRS-Énergie et Matériaux (Institut National de la Recherche Scientifique), Québec, Canada. He was a professor of Electro-thermo-mechanical aspects at NSERC -Hydro-Quebec, Industrial Research Chair at UQTR. Since 1998, he has been with UQO (Université du Québec en Outaouais), as a titular Professor and responsible for LIMA laboratory (Avanced Microsystem Engineering Laboratory) developing IP core and embedded algorithms for microsystems and thermo-mechanical sensors. His research interest is the fields of bio-heat thermal modeling such as: heat diffusion in biological tissues, metabolic heat generation and external interactions, heat transfer mechanism in biological tissues for thermal therapeutic practices including dedicated bio-implantable puce design for cancer thermal dose control. Also, his interest is in Design of Fully Automated tool for Porting Analog and Mixed signal circuits within Different Technology nodes. He is a member of IEEE, The Microsystem Strategic Alliance of Quebec (ReSMiQ), the OIQ (Ordre des Ingénieurs du Québec, Canada), NanoQuébec and has more than twenty two years' experience with a large expertise with applications in the fields of Electro-Thermo-mechanical analysis for electronic and microelectronics system design. He is the author/co-author of more than 200 scientific publications and research report, and thesis advisor of 70 graduate and undergraduate students who completed their studies.

Keynote Speaker

Challenges and Methodology for Controlling Thermal Doses During Cancer Therapeutic Treatment

Abstract

Bio-implantable microsystems are a breakthrough technology that can improve human health and facilitate new medical applications in healthcare sector. Controlled thermal ablation in order to maximize the therapy and minimize the side effects poses a challenge during the heating of the biological tissue. Traditionally, these processes are modelled by the bio heat equation introduced by Pennes, who used the Fourier's theory of heat conduction. This talk presents an overview of research at the LIMA Laboratory in the UQO (Université du Québec en Outaouais) , Canada, and present our proposed system able to control thermal ablation doses deposition during a laser surgery/cancer treatment, their control strategies and their inclusion, in the integrated Bio-Implantable dosimetry systems. During my talk I will present our automated thermal dose control and prediction system for cancer tumors therapy by using implantable bio-microchip solution. A system would help physicians to predict thermal diffusion to organize the treatment as well as maximize therapeutic effects while minimizing side effects. A case study of the Laser Interstitial Thermal Therapy (LITT) will demonstrate his feasibility as Cancer therapeutic treatment. Furthermore, our Dosimetry Framework of the Bio-heat Transfer for Laser/Cancer Treatment will be introduced. This would provide a precise idea of the predicted reaction depending on selected doses, tissue geometry, and the laser source prior to the treatment; so new treatment strategies can be proposed and evaluated. Our research activities aim to create bio-implantable microchip, thermal sensors and actuators for biomedical sector. This enables several benefits, and leads to innovative biomedical integrated systems with applications in healthcare sector.