UNIVERSITY OF TEXAS ARLINGTON | DEPARTMENT OF ELECTRICAL ENGINEERING

Optical fibre sensors: guiding the future of radiotherapy

Sinead O'Keeffe, Ph.D.
Department of Electronic & Computer Engineering
University of Limerick, Ireland

ABSTRACT: Radiotherapy is the use of ionizing radiation for the treatment of cancer, with 50 – 60 % of patients requiring radiotherapy at some point during their treatment. It is typically delivered in the form of external beam radiotherapy (EBRT), using linear accelerators (linacs), or internally, known as brachytherapy (BT). The radiation damages the cancerous cells, inhibiting them from continuing to grow and divide. However it is inevitable that some surrounding healthy tissue is also damaged. For improved patient outcomes, accurate and real-time knowledge of the radiation dose to critical structures is essential, ensuring that these side-effects can be minimised, while maintaining the standard of treatment. Optical fibre sensors offer numerous advantages over conventional radiotherapy sensors for monitoring these radiation doses. The small dimensions of the optical fibre sensors make them suitable for minimally invasive in-vivo applications. This allows the sensors to be placed internally, in close proximity to the brachytherapy implants, in the tumour itself or near critical tissues requiring monitoring. The miniaturisation of the sensors also allows them to be guided within existing brachytherapy equipment allowing for real-time, minimally invasive monitoring, for example within the seed implantation needle, in the urinary catheter to monitor urethral dose, or through the biopsy needle guide of the transperineal ultrasound probe to monitor rectal wall dose. This talk will present recent advances in optical fibre based dosimeters for monitoring radiation doses in different clinical environments, e.g. external beam radiotherapy, brachytherapy and proton beam.

BIOGRAPHY: Dr. Sinead O'Keeffe is a Royal Society – Science Foundation Ireland University Research at the Department of Electronic & Computer Engineering, University of Limerick and a member of UL's Health Research Institute. She is leading a team that focuses on the development of photonic sensor systems for biomedical applications. Her current research primarily focuses on the development of optical fibre based sensors for the diagnosis, assessment and treatment of cancer tumours. She is co-ordinator for the recently funded European H2020 Project "ORIGIN" developing optical fibre based sensors for real-time dose imaging and source localisation for adaptive brachytherapy. She is Member-at-Large of the IEEE Sensors Council for 2017-2020 and Chair of the IEEE Sensors Council Women in Sensors Committee.

.

November 20, 2020 Friday, 11:00 am – Noon

Join Microsoft Teams Meeting

+1 817-502-2418 United States, Fort Worth (Toll)

Conference ID: 865 262 965#

Local numbers | Reset PIN | Learn more about Teams | Meeting options