BIOENGINEERING & BIOMEDICAL ENGINEERING RESEARCH SEMINAR

ELECTROMAGNETIC MEDICAL TECHNOLOGIES AND THE DIELECTRIC PROPERTIES OF TISSUES

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BIO

Dr. Emily Porter is an EU Marie-Curie ASSISTID Fellow and Adjunct Lecturer at the National University of Ireland Galway. She received her B.Eng., M.Eng., and Ph.D. degrees in electrical engineering from McGill University, Montreal, Canada, in 2009, 2010, and 2015 respectively. Since 2015, she has been with the Translational Medical Device Laboratory at the National University of Ireland Galway. Her current research interests include the measurement of dielectric properties of biological tissues and the development novel technologies for therapeutic and diagnostic applications of electromagnetic waves. Dr. Porter is the recipient of several prestigious national and international awards, including the URSI Young Scientist Award, the IEEE Antennas and Propagation Society Doctoral Research Award, the Irish Research Council (IRC) "New Foundations" Grant, and the Royal Irish Academy (RIA) Charlemont Grant

ABSTRACT

Medical devices are increasingly investigated in the academic sector with the same rigor present in a commercial setting, thus ensuring that any technology developed has a realistic chance of translating from "research bench to patient bedside" and making a positive impact on patient care. Within the context of an aging population and an exponential growth in healthcare costs, electromagnetic (EM) therapeutic and diagnostic technologies provide an attractive solution, since they are low cost, non-ionizing, and largely non-invasive. The dielectric properties of healthy and diseased tissues are the foundation for such techniques. Despite the importance of these properties, reported values have been inconsistent, especially for key heterogeneous tissues. This inconsistency results in an unsatisfactory basis for the design and optimization of EM medical technologies, and unacceptable technical risk in the translation process. This talk will discuss the state of the field, including confounders that impact the dielectric measurement of tissues, along with proposed methods for compensating for them. Needs-driven medical devices in development, including for microwave breast cancer detection, ablation of the adrenal gland to treat Conn's syndrome, and bladder state monitoring, will also be highlighted.

SEPTEMBER 21, 2018
WONG 1030
1:00PM

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