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European Conference on the Spectroscopy of Biological Molecules – Dublin 2019

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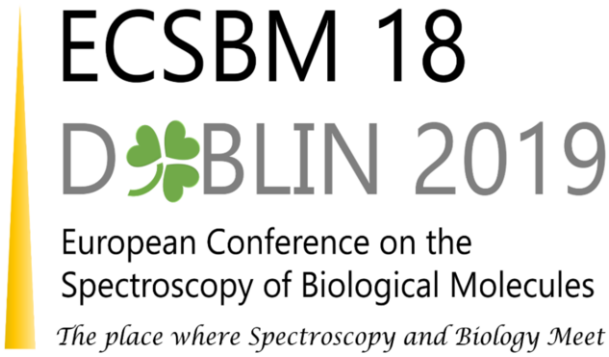

Initiated in 1985, the bi-ennial European Conference on the Spectroscopy of Biological Molecules (ECSBM) has become recognised as one of the leading international conferences at which applications of biomolecular spectroscopy in fundamental scientific research, medical and clinical sciences, and the pharmaceutical industries are explored [1]. The 18th edition of ECSBM took place in the O'Brien Centre for Science, University College Dublin from the 19th – 22nd August 2019, co-chaired by Susan J. Quinn, UCD, and Hugh J. Byrne, TU Dublin.

Spectroscopy of Biological Molecules entails the fundamental understanding of biomolecular structure, function and dysfunction, their contributions in organisms, including plants, animals and humans, as well as the development of technologies to monitor their presence, performance, and/or production (e.g. diagnostic imaging, process control). ECSBM provides a platform for a multidisciplinary community, developing a wide range of spectroscopic techniques (IR, Raman, UV-Vis, fluorescence, NMR, EPR) for the investigation of the structures, functions and dysfunctions of biological molecules, exploring the potential applications of the techniques in areas including food and nutrition, biomedical imaging, anticancer research, drug delivery and nano-biotechnology. The scope of the scientific topics covered has recently extended to applications in the fields of biomedical imaging, anticancer research, drug delivery and nano-biotechnology. At the meeting in Dublin, the impact for food science and nutrition was also included within the scope of the programme.

In total, the meeting was attended by 177 delegates, from 22 countries, including USA (3) and Brazil (5). The programme entailed 18 oral, and 2 poster sessions. There were a total of 70 oral and 69 poster

presentations, as well as 25 flash presentations, to introduce the poster sessions. The daily Conference Exhibition attracted exhibits from 10 company sponsors.

Plenary Presentations were delivered by Prof. John M. Kelly, Trinity College Dublin, Ireland, who spoke about the history and continued evolution of "Transient Spectroscopic Studies of the Photophysical Properties of DNA-Intercalated Molecules", and Prof. Duncan Graham, University of Strathclyde, Glasgow, UK, who discussed "Raman And SERS Spectroscopy for Bioanalysis".

A further 13 invited presentations were delivered, including the IOS Press Sponsored Lecture, by Prof. Klaus Gerwert, Ruhr-University Bochum, Germany on "Label-free Tissue Classification by QCL based IR-Imaging". *Biomedical Spectroscopy and Imaging*, published by IOS Press, has been closely involved with the ECSBM conference series for many years. This has included publishing the proceedings from the conference, especially publishing articles from keynote/plenary speakers. The current issue of the journal includes several articles that have been presented at the 18th ECSBM conference [2–6]. This includes a review article by Klaus Gerwert, an IOS Press sponsored invited speaker at the conference in Dublin. Gerwert's team has been at the forefront of research advancing the application of vibrational spectroscopy for clinical applications. In their article, Großerueschkamp and Gerwert discuss the implementation of label-free digital pathology by infrared imaging [2]. They have obtained sensitivities and specificities exceeding 90% as compared to the gold standard histopathology [2]. The methodology developed is now at an advanced state and is ready for validation in clinical settings. It is hoped that this will be achieved soon paving the way for the technique to be accepted and adopted by clinicians for rapid diagnosis of different disease states.

At the conference, individual sessions were also sponsored by Aquilant and Horiba, while the Institute of Chemistry of Ireland gave 3 prizes for poster presentations:

Fucsia Crea, (Freie Universität Berlin, Germany), Photo-Activation of Mechanosensitive Ion Channels

Lenka Michálková, (University of Chemistry and Technology Prague, Czech Republic), Early Detection of Pancreatic Cancer Using ^{1}H NMR Metabolomics: Prediction of Pancreatogenic Diabetes

Sidney Dicke, (University of Wisconsin-Madison, USA), Amyloid Identified within Pancreas of Diabetic Mice using 2D Microscopy

Continuing the trend of recent conferences, biomedical aspects of vibrational spectroscopy and spectroscopic imaging were prominent throughout the week. The increasing clinical relevance of the techniques was showcased by presentations on applications of mid-Infrared spectroscopic imaging for scoring of Squamous Cell Lung Carcinoma tumour aggressiveness (Olivier Piot, University of Reims Champagne-Ardenne, France). Potential clinically applications of real-time near Infrared fluorescence imaging tools with also discussed (Donal O'Shea, (RCSI, Ireland). Applications of confocal Raman microspectroscopy were particularly prevalent, for cytology (Bryan Hennelly/Kevin O'Dwyer, NUIM, Ireland), cervical cancer screening and HPV Testing, (Damien Traynor, TU Dublin, Ireland), early detection of oral lesions, (Isha Behl, Technological University Dublin, Ireland), breast cancer screening, (Aidan Meade, TU Dublin, Ireland), and characterisation of leukocyte activation during stimulation and infection (Ute Neugebauer, Jena University Hospital, Germany), while C. Murali Krishna, (Advanced Centre for Treatment Research and Education in Cancer, Navi Mumbai, India), discussed Sampling Methods for Raman spectroscopic analysis of saliva. Catherine Kendall (Biophotonics Research Unit, Gloucestershire Hospitals NHS Foundation Trust, UK) presented a discourse on the Current Challenges and Further Prospects of Raman Spectroscopy in Molecular Cancer Diagnostics. Marloos Groot (VU

Amsterdam, The Netherlands) presented recent results on the use of second and third sum frequency generation to discriminate cancer cells in brain tissue and towards in surgery instant pathology.

Malgorzata Baranska (Jagiellonian University, Krakow, Poland) described the applications of Raman Imaging in exploration of the pharmacology of the endothelium, while other presentations explored drug uptake and mode of action in Vitro (David Perez-Guaita, TU Dublin, Ireland) and drug-biomembrane interaction on microcavity supported bilayers (Nirod K. Sarangi, Dublin City University, Ireland). Applications of the novel combination of synchrotron-based FTIR and quasi-elastic neutron scattering in the search for new chemotherapeutic targets, including subcellular water, was described by Maria Paula M. Marques (University of Coimbra, Portugal).

The use of ultrafast infrared spectroscopy was demonstrated, to gain fundamental insight into Vibrational Energy Transfer in Proteins (Jens Bredenbeck, Johann Wolfgang Goethe-University, Frankfurt am Main, Germany), Ultrafast Proton Transport Along Solvent Bridges (Erik Nibbering, Max Born Institut, Berlin, Germany) and Proton Transfer and Proton Coupled Electron Transfer in Blue Light Sensing Flavoproteins (Stephen Meech, University of East Anglia, UK).

Several presentations described developing and emerging techniques and technologies in biospectroscopy, including Mid-infrared Time-resolved spectroscopy with femtosecond to millisecond time-resolution using a multiple probe technique (Michael Towrie, Central Laser Facility, STFC, UK), Mid-Infrared Biospectroscopic Applications of Quantum Cascade Laser Frequency Combs (Markus Mangold, IRsweep, Stäfa, Switzerland) and applications for Imaging of Colorectal Cancer Tissue for Clinical Diagnostics (Frederik Großerüschkamp. Ruhr-University Bochum, Germany), Fluorescence-Detected Two-Dimensional Electronic Spectroscopy (Thomas L. C. Jansen, University of Groningen, The Netherlands), 2D-IR Spectroscopy (Julian M. Schmidt-Engler, Johann Wolfgang Goethe-University, Frankfurt, Germany), Vibrational Stark Effect Spectroscopy (Lauren J. Webb, Texas Materials Institute, Texas, United States), Stimulated Raman Scattering Microscopy (Liron Zada, Vrije Universiteit, Amsterdam, The Netherlands) and Correlative FTIR And X-Ray Fluorescence Imaging (Tanja Ducic,, University of Belgrade, Serbia). Developments in sampling methods to allow improved spectroscopic characterisation were also presented, including Microfluidic Models for Biophysical Studies of Membrane Proteins and Lipids (Tia Keyes, Dublin City University, Ireland), Combining Protein Microarrays and Infrared Imaging to allow High Throughput Structural Characterisation of Proteins (Erik Goormaghtigh, Université Libre de Bruxelles, Belgium.

Over the course of the week, the quality of the presentations and excellence of the science, the advancements in the field, as also demonstrated by the exhibitors, the vigour of the scientific and participant interactions, clearly attest to the success of the event, and the thriving vitality of the field of the Spectroscopy of Biological Molecules, in Europe and Beyond.

Biomedical Spectroscopy & Imaging plans to further strengthen its link with the ECSBM conference series and looks forward to publishing high quality research articles from the next conference.

Conflict of interest

The authors have no conflict of interest to report.

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