

The Tribochemistry Award

Presented to

Dr. Nicholas D. Spencer

In recognition of his outstanding contributions to tribochemistry by The Tribochemistry Technical Committee (Chair: Dr. Keiji Nakayama), Japanese Society of Tribologists (JAST) in September 2023 at “Tribochemistry Beppu 2023”.



Dr. Nicholas D Spencer was born and educated in the UK, obtaining his academic degrees at the University of Cambridge, where he began his research career as a surface chemist. Following his PhD, he moved to the University of California, Berkeley, for a postdoctoral fellowship, working on fundamentals of ammonia synthesis. For the next 11 years he worked in the US chemical industry in the areas of catalysis, superconductors and analytical research. It was here, working with the new technique of lateral-force microscopy, that he first encountered tribology.

In 1993 Dr. Spencer became Professor of Surface Science and Technology, in the Department of Materials at the ETH Zurich, Switzerland, founding laboratories working in the areas of tribology, biomaterials and surface functionalization. He has served as Head of the ETH

Department of Materials and has taught tribology and surface science to many generations of Swiss students, as well as having given invited courses on surface science and tribology worldwide.

Dr. Spencer has made a number of outstanding contributions to the field of tribochemistry. He has pioneered the use of polymer brushes for microscopic and macroscopic lubrication in both aqueous and oil-based environments, significantly advancing our understanding of such systems and our ability to apply them in applications ranging from catheters to concrete slurries. Recently, his group was able to imitate cartilage properties by grafting polymer brushes onto hydrogels. By harnessing the power of imaging surface-analytical approaches, Dr. Spencer created the combinatorial approach to the study of lubricant-additive behavior, which enables “libraries” of tribological-parameter combinations to be obtained for a particular additive, which can subsequently be cross-correlated with the presence of individual surface-chemical species. By developing new surface-analytical approaches for tribology, Dr. Spencer has provided insights into many fundamental tribological phenomena. Examples include the coupling of morphological gradients with scanning-probe microscopy for investigating the influence of roughness on friction and adhesion, the development of in situ infrared spectroscopic methods for analyzing additive reactions with surfaces during tribological stress, and the use of friction-force microscopy to map chemical differences in surfaces.

Dr. Spencer is co-founder of "Tribology Letters" one of the premier journals in the field, and has been its Editor-in-Chief over the last three decades. He is also co-founder of the Swiss Tribology Association, and the International Nanotribology Forum, under whose auspices he has organised ten workshops on nanotribology in Asia. The author of over 400 journal articles on tribology, surface functionalization, catalysis, biomaterials, and polymers, Dr. Spencer has delivered several hundred invited and keynote lectures at international meetings. He also has five books and 15 patents to his name. Spencer is a member of the Swiss Academy of Engineering Sciences, a Fellow of both the Royal Society of Chemistry (UK) and the Society of Tribologists and Lubrication Engineers (US), and recipient of both the 2022 STLE International Award and the 2018 Tribology Gold Medal. He has contributed to the ITC and WTC satellite forums on Tribochemistry as a member of the International Advisory Board for many years.

Dr. Spencer has contributed significantly to the development of tribochemistry through his pioneering research work, ranging from basic science to applied technologies, especially through his work on polymer brushes for lubrication and by developing new, outstanding surface-analytical approaches for tribology.

Dr. Spencer is indeed a worthy recipient of the world's highest honor in tribochemistry – The Tribochemistry Award for 2023.