Press Release

Aug. 24, 2021
Association of Asia-Pacific Physical Societies (AAPPS)
Division of Plasma Physics (AAPPS-DPP)

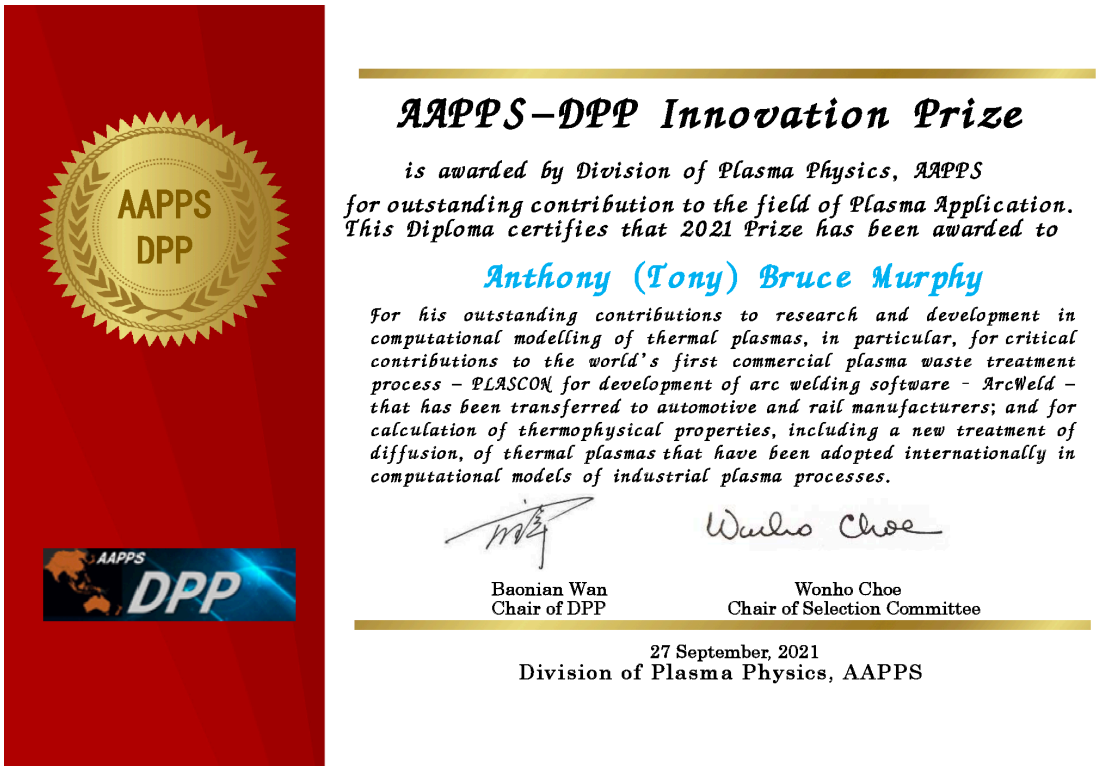
AAPPS-DPP Plasma Innovation Prize

– Dr Anthony (Tony) Murphy is selected as Third Laureate –

The Division of Plasma Physics (CEO: Mitsuru Kikuchi, Chair: Baonian Wan) under the Association of Asia Pacific Physical Societies (President: Jun'ichi Yokoyama) selected Dr. Anthony (Tony) Murphy of CSIRO (Commonwealth Scientific and Industrial Research Organisation) in Australia as the third Laureate of AAPPS-DPP Plasma Innovation Prize, which is awarded to scientists who have made seminal / pioneering contributions in the field of plasma applications, focusing on impacts on industry.

Citations

Anthony (Tony) Bruce Murphy: *"For his outstanding contributions to research and development in computational modelling of thermal plasmas, in particular, for critical contributions to the world's first commercial plasma waste treatment process - PLASCON; for development of arc welding software – ArcWeld - that has been transferred to automotive and rail manufacturers; and for calculation of thermophysical properties, including a new treatment of diffusion, of thermal plasmas that have been adopted internationally in computational models of industrial plasma processes."*



Certificate, medal and cash prize will be given at the 5th Asia-Pacific Conference on Plasma Physics in Sept 27, 2021

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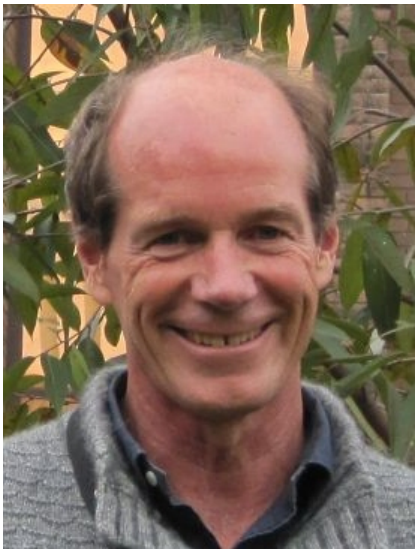
AAPPS-DPP Homepage Address : http://aappsdpp.org/AAPPSDPPF/index.html

On the achievements of Dr. Anthony (Tony) Murphy



Dr Tony Murphy was born in Sydney, Australia, in 1960. He was awarded a PhD in physics from the University of Sydney in 1987 and was a Postdoctoral Research at the Max Planck Institute for Plasma Physics in Munich, Germany, from 1987 to 1989. He then took up a position as a Research Scientist at CSIRO in Sydney, Australia. Dr Murphy is currently a Chief Research Scientist and leads the Materials and Process Modelling Team.

Dr Murphy has worked mainly on the physics, chemistry and applications of thermal plasmas, which are high-temperature plasmas used for applications ranging from arc welding to nanoparticle production. His research has included computational fluid dynamic modelling, calculating the thermophysical properties of plasmas, and optical diagnostics. He has collaborated with major international companies, including **General Motors**, **CRRC (China Rail and Rolling Stock Corporation)**, **LS Electric, Boeing and Siemens**, and several smaller Australian companies.

Highlights of Dr Murphy's research and development include:

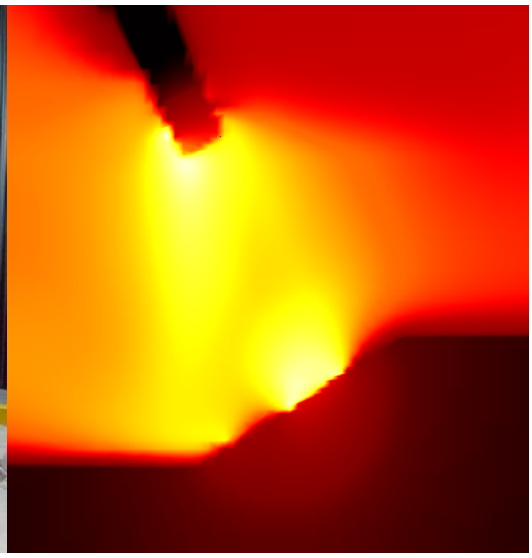
- An essential role in the development of the PLASCON plasma waste treatment process. This was the first commercial process to employ a thermal plasma to destroy hazardous chemicals. **PLASCON** (now renamed PyroPlas®) plants have been operating around the world for almost 30 years, destroying ozone-depleting substances, greenhouse gases and toxic organic chemicals. Dr Murphy's contributions included detailed computational simulations that paved the way for the successful destruction of **ozone-depleting substances** and **fluorocarbon greenhouse gases**.

- The development of the "**ArcWeld**" welding simulation software for industrial use. The software, which runs on a standard desktop computer, is unique in that it explicitly incorporates the arc plasma in the computational model. This increases the reliability of the results and **allows a dramatic reduction in the experimental benchmarking** required when welding parameters are changed. The software has been transferred to **automotive** and **rail manufacturers**. Dr Murphy is currently working on extending this software to simulate the wire-arc additive manufacturing process.

- The calculation of thermophysical properties of thermal plasmas used in a wide variety of applications, including arc welding, circuit breakers, plasma spraying, plasma cutting, arc lamps and waste treatment. Accurate values of these properties, such as thermal conductivity, specific heat and electrical conductivity, are essential for computational modelling of plasma processes. Dr Murphy's data have been adopted by more than 60 companies and research groups in over 25 countries. Recently they have played an important role in the development of new high-voltage circuit breakers that use environmentally friendly gases to replace sulfur hexafluoride, which is being phased out because of its high global warming potential.

Dr Murphy has published over 300 papers in refereed scientific journals, which have been cited almost 10,000 times. He has presented over 100 invited, keynote and plenary lectures at international scientific conferences and summer schools. Previous awards for Dr Murphy's research include medals from the Australian Academy of Science, the Institute of Physics (UK), the Australian Institute of Physics and the Royal Society of NSW. He is a Fellow of the American Physical Society, the Institute of Physics (UK) and the Australian Institute of Physics. He holds editorial positions with five international journals, including Editor-in-Chief of Plasma Chemistry and Plasma Processing and Associate Editor of Journal of Manufacturing Processes.

PLASCON



Arc-welding

Appendix: AAPPS-DPP Plasma Innovation Prize

AAPPS-DPP Plasma Innovation Prize was founded by the AAPPS-DPP in 2019. This prize is given to a plasma physicist/engineer annually to recognize outstanding contributions to experimental and/or theoretical research in all fields of plasma applications, focusing on impacts on industry. The 2021 Selection Committee composed of leading physicists of plasma application in Asia-Pacific region. 1st Laureate (2019) is Prof. Roderick Boswell (Australian National University) and 2nd Laureate (2020) is Prof. M. Hori (Nagoya University).

2021 Selection committee:
Chairman: Prof. Wonho Choe (Korea Advanced Institute of Science and Technology)
Members: Prof. Masaharu Shiratani (Kyushu University)
Prof. Tomohiro Nozaki (Tokyo Institute of Technology)
Prof. Yi-Kang Pu (Tsinghua University)
Prof. Jiajun Shi (Donghua University)
Prof. Aryasomayajula Subrahmanyam (Indian Institute of Technology, Madras)
Prof. Ashish Ganguli (Indian Institute of Technology, Delhi)
Prof. Bong Guen Hong (Chonbuk National University)
Prof. Rajdeep S. Rawat (Nanyang Technological University)
Prof. Paul K. Chu (City University of Hong Kong)
Prof. Matthew Hole (Australian National University)
Prof. Jang-Hsing Hsieh (Ming Chi University of Technology)