

**Professor Stanley Whittingham, Hon DSc 26 July 2023, pm**

Provost

Our honorary graduand this afternoon is Distinguished Professor of Chemistry, Materials Science and Engineering at Binghamton University in the USA, and a Nobel Laureate. I am delighted to introduce PROFESSOR STANLEY WHITTINGHAM.

Most of you here today have in your pockets, or in your hands, a mobile 'phone. Some of you may have driven here in an electric car. These now familiar technologies rely on lithium-ion batteries for power and indeed you will have probably charged your 'phone this morning without even thinking, such as it has become second nature in past decades. Stan Whittingham is one of the scientists who made the key discoveries that led to the development of this technology in the 1970s, and he was awarded a Nobel Prize in Chemistry in 2019 for the development of lithium-ion batteries. His discoveries remain highly relevant as they will be crucial in enabling a society free of fossil-fuels, if you consider the immense challenges in storing and transporting energy from renewable sources, such as solar and wind.

Stan grew up and attended school not far from here in Nottinghamshire and Lincolnshire before his career began at Oxford, with a BA in Chemistry in 1964, and a DPhil in 1968. Post-doctoral research in California at Stanford University followed (in his words, "wanting to see the sunshine"), before an appointment in industry at Exxon. It was here, in 1976, during an earlier energy crisis, that he demonstrated with his prototype Li-ion battery how bulk intercalation could be used to store and release energy— an important milestone for today's modern Li-ion batteries. (For the non-scientists in this afternoon's audience, let me quote Professor Whittingham's own, down-to-earth description of this process: 'It's like putting jam in a sandwich'.) He became a professor at Binghamton University in 1988, and was Vice-Provost for Research, 1994-2000. He is currently Director for the

Northeast Center for Chemical Energy Storage, a US Department of Energy facility based at Binghamton.

Stan's scientific training is in the field of solid-state chemistry. This is something my own students here today will be familiar with, and hopefully will appreciate; but to many the study of the chemistry of solid materials sounds perhaps rather dry and irrelevant to advanced technology. In fact, Stan's earliest work came from a growing recognition that atoms in solids can be highly mobile and dynamic, which then lead to the idea of using positively charged lithium ions to transport charge within a material, hence being able to store electrical energy in a convenient solid form ready to later discharge and provide power where needed.

As well as his revolutionary chemistry, Stan's career is pioneering in another aspect since he recognised early the importance of carrying out scientific research in new environments, both overseas, and moving between academia and industry. This has also included close cooperation with physicists and with engineers to develop novel materials into working devices. Now, this is how science is expected to be performed, in a highly collaborative manner with regular exchange of students and researchers to spark new ideas from different individual perspectives, but this was much less common 50 years ago.

Professor Whittingham's work resonates hugely with our own research at Warwick. We have, in WMG, the Energy Innovation Centre, a purpose-built, national facility for battery research across the entire R&D process. Work is currently focused on developing cheaper, higher energy density, safer batteries; a recent £20 million government grant will enable a significant expansion of the Centre's facilities. In Chemistry much fundamental research is focussed on aspects of energy and sustainability. Professor Whittingham's multi-disciplinary approach spanning Chemistry, Physics, Materials Science, Engineering, endorses our own approach to research at Warwick on Energy, Innovative Manufacturing and Future Materials, and Sustainable Cities, and to the STEM subjects.

In addition to the Nobel Prize, Professor Whittingham holds a number of other prestigious awards including the American Chemical Society's Award for Lifetime Contributions; the Senior Scientist Award from the International Society for Solid State Ionics, and the Turnbull Award from the Materials Research Society. He is a member of the US National Academy of Engineering, a Fellow of the Royal Society here in the UK, and a Thomson Reuters Citation Laureate. His work has laid the foundation for a more sustainable future. It is a great pleasure to welcome him to Warwick today.

Provost: in the name of the Senate, I present to you for admission to the degree of Doctor of Science, *honoris causa*, PROFESSOR STANLEY WHITTINGHAM.