

Professor Sir Colin Humphreys CBE FREng FRS

Chair: Dr Alan Finkel AO FAA FTSE

Thursday 22 November 2018 Lecture Theatre G81 Learning and Teaching Building
5.30pm 19 Ancora Imparo Way
Clayton Campus

How electron microscopy can help to save energy, save lives, create jobs and improve our health

Electron microscopes can not only image single atoms, they can identify what the atom is and even determine how it is bonded to other atoms. This talk will give some case studies from Colin Humphreys' research group going from basic science through to commercial applications, featuring two of the most important new materials: gallium nitride and graphene. Electron microscopy has played a key role in the rapid advance of gallium nitride (GaN) LED lighting. LED lighting will soon become the dominant form of lighting worldwide, when it will save 10-15% of all electricity and up to 15% of carbon emissions from power stations. Electron microscopy has enabled us to understand the complex basic science of GaN LEDs, improve their efficiency and reduce their cost. The Humphreys' group has been very involved in this. LEDs based on their patented research are being manufactured in the UK, creating 150 jobs. Next generation GaN LEDs will have major health benefits and future UV LEDs could save millions of lives through purifying water.

Graphene has been hailed as the "wonder material", stronger than steel, more conductive than copper, transparent and flexible. However, so far no graphene electronic devices have been manufactured because of the lack of good-quality large-area graphene. We have developed a new way of making large-area graphene, based on understanding the fundamental science involved and set up a new company which moved into premises this January. It is already employing 14 people and has filed eight patents. Electron microscopy is essential to image graphene and its dopant atoms, and to develop graphene electronic devices and sensors which promise to greatly benefit our health.

Many congratulations to the MCEM on a hugely successful first ten years!

Professor Sir Colin Humphreys CBE FREng FRS



Professor Sir Colin Humphreys is a materials scientist who is internationally renowned for his research on the electron microscopy of semiconducting materials. He has pioneered the development of low-cost, high-efficiency LED lighting, which is now under manufacture by the company he founded, Plessey Lighting Ltd. He is also the founder, Director and Chairman of Paragraf Ltd, which produces large-area graphene by a new method suitable for manufacturing devices.

Sir Colin is Professor of Materials Science at Queen Mary University of London, Emeritus Professor of Materials Science at the University of Cambridge and Fellow of Selwyn College, University of Cambridge. He is the recipient of many distinguished international awards, including the European Materials Gold Medal; The Kelvin Medal and Prize; the Rosenhain Medal and Prize; the Henry Clifton Sorby Award; the Platinum Medal of the Institute of Materials, Minerals and Mining and the Robert Franklin Mehl Gold Medal.

Dr Alan Finkel AO - Australia's Chief Scientist



Dr Finkel commenced as Australia's eighth Chief Scientist on 25 January 2016.

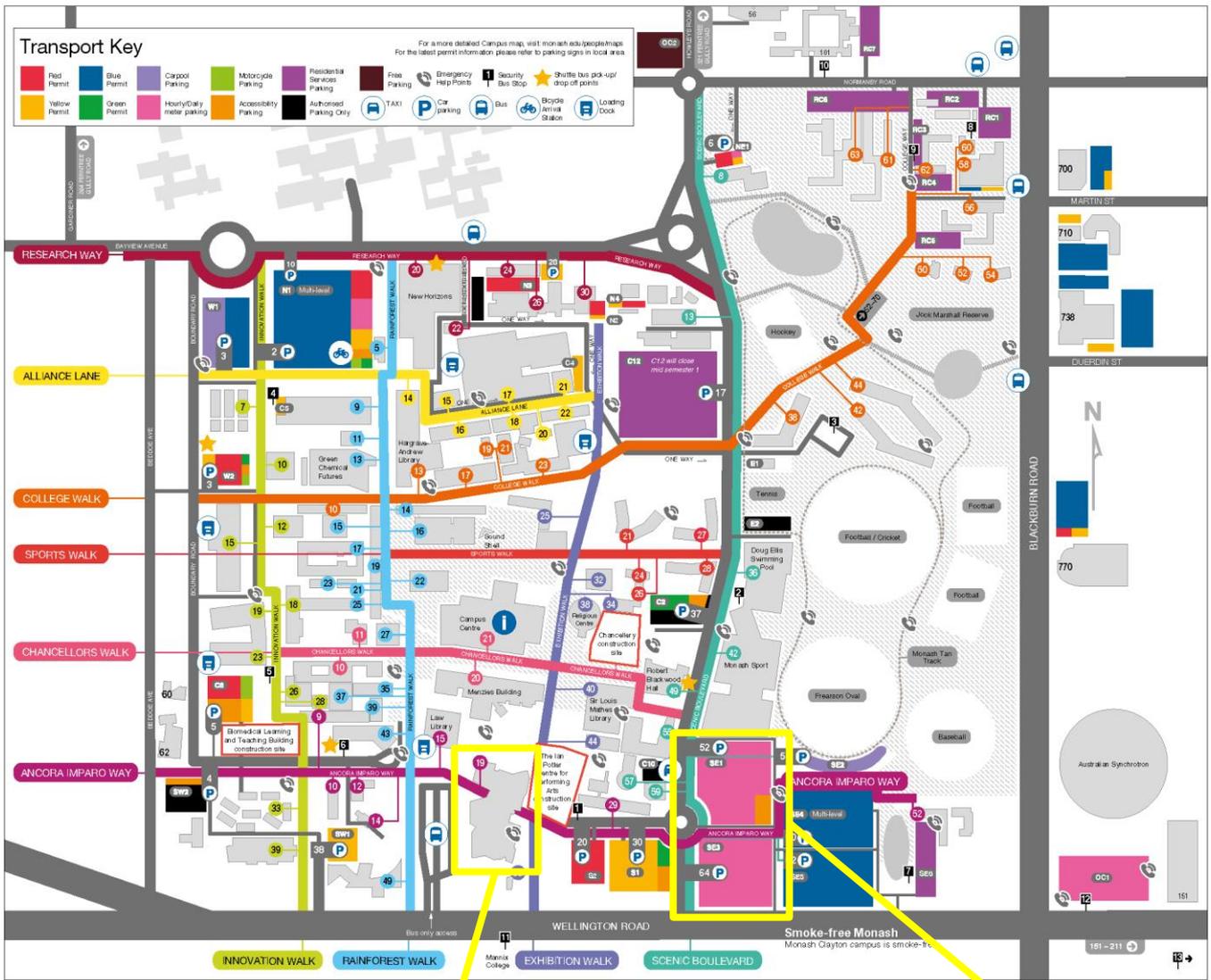
Dr Finkel has an extensive science background as an entrepreneur, engineer, neuroscientist and educator.

Prior to becoming Chief Scientist, he was the eighth Chancellor of Monash University and the eighth President of the Australian Academy of Technology and Engineering (ATSE).

Dr Finkel was awarded his PhD in electrical engineering from Monash University and worked as a postdoctoral research fellow in neuroscience at the Australian National University.

In 1983 he founded Axon Instruments, an ASX-listed company that made precision scientific instruments. He is also a co-founder of Cosmos Magazine.

Monash University Clayton campus



Learning and Teaching Building

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