RESEARCH in the national interest – enabling the future

Professor Paul Mulvaney

Molecular Plasmonics: from Single Electrons to Quantum Catalysis and Optical Logic Gates

Current Organisation:	The University of Melbourne
Administering Organisation:	The University of Melbourne
Primary research field:	Physical Chemistry (incl. Structural)
National Research Priority:	Frontier Technologies for Building and Transforming Australian Industries

Professor Paul Mulvaney is an Australian Research Council (ARC) Federation Fellow in the School of Chemistry and Bio21 Institute at the University of Melbourne and Co-Director of the University of Melbourne's Centre for Nanoscience and Technology. His current research interests include plasmonics, the optical properties of single quantum dots, nanocrystal based biochemical markers, nanocrystal electronics, nanomechanics and the use of atomic force microscopy to measure surface forces.

The key goal of Professor Mulvaney's project is to explore the practical limits for plasmonics: the manipulation of light using metal nanostructures. In particular, the expected outcomes include the optical detection of single electrons, the detection and monitoring of chemical reactions one molecule at a time, and demonstration of light-driven logic gates. These outcomes have many potential applications and will form the basis of optical computing.

Professor Mulvaney was awarded his PhD in Physical Chemistry in 1989 from The University of Melbourne. He was appointed a research scientist at the Hahn-Meitner-Institute for Nuclear Research in Berlin. In 1993 he returned to The University of Melbourne as an ARC QEII Research Fellow. Professor Mulvaney was a Humboldt Research Fellow at the Max-Planck Institute, Potsdam in 2000. He is a co-inventor of five patents in the field of nanotechnology.

Professor Mulvaney has published over 180 scientific papers and his work has accumulated around 11,000 citations. He is currently the Chair of the Colloid Chemistry Division of the Royal Australian Chemistry Institute (RACI), and is on the Executive Committee of the ARC Nanotechnology Network. Professor Mulvaney is a member of the Editorial Boards of *Advanced Functional Materials*, *NanoToday*, *Langmuir*, *Small*, *PCCP and J.Mater Chem*. He is the recipient of the David Syme, Luigi Provasoli and Grimwade Prizes and was made a Fellow of the Australian Academy of Science in 2009.

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