

PART 1

1a. Personal details				
Full name	<i>Title</i>	<i>First name</i>	<i>Second name(s)</i>	<i>Family name</i>
	A Prof	Martin	Alexander Keith	Williams
Present position	Associate Professor in Biophysics			
Organisation/Employer	Massey University			
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1b. Academic qualifications

Jan 1991 - Dec 1993: The Open University: Degree of Doctor of Philosophy
NMR Investigations of Ionic Host Polymer Systems
1987 – 1990: Leeds University: B.Sc. (Hons.) Physics with Astrophysics

1c. Professional positions held

January 2011-Present
Institute of Fundamental Sciences, Massey University, NZ, Assoc. Professor in Physics
March 2003-December 2010
Institute of Fundamental Sciences, Massey University, NZ, Senior Lecturer in Physics
Oct 1998– Mar 2003
Unilever Research Colworth, Sharnbrook, UK: Physical Scientist
Jan 1994 - Sep 1998
York University: Postdoctoral Fellow

1d. Present research/professional speciality

Biological Physics and Soft Condensed Matter

1e. Total years research experience	20 years
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1f. Professional distinctions and memberships (including honours, prizes, scholarships, boards or governance roles, etc)

- Fellow and Secretary, New Zealand Institute of Physics, 2012
- RSNZ Appointed New Zealand Delegate at 17th IUPAB Meeting, Beijing, 2011.
- Voted onto Council, International Union of Pure and Applied Biophysics, 2011.
- Invited to give the Pilnik Lecture at the European Hydrocolloids Meeting, 2011.
- IFS Distinguished Teaching Award, for Research-led Teaching in Physics, 2009.
- Invited Participant at a Gordon Research Conference Soft Meets Biology, 2009.
- Editorial Board of Food Hydrocolloids, 2008-.
- Editorial Board of Biophysical Reviews, 2011-.
- International Scientific Advisory Board for IHC, 2008-2010.
- Associate Investigator in Riddet Institute CoRE, 2008.
- Science Executive of The MacDiarmid Institute CoRE, 2006 - 2012 .
- Theme Leader, Theme IV, Soft Materials, in The MacDiarmid CoRE, 2006- 2012.
- Royal Society of Chemistry Food Group Junior Medal, 2004.
- Principal Investigator in The MacDiarmid Institute CoRE, 2004-.
- Chartered physicist, Member of Institute of Physics, 1994.

1g. Total number of peer reviewed publications and patents	Journal articles	Books, book chapters, books edited	Conference proceedings	Patents
	84	3	2	1

PART 2

2a. Research publications and dissemination

Peer-reviewed journal articles

Structure and properties of non-processive, salt-requiring, acidophilic pectin methylesterases from *Aspergillus niger*, Kent LM, Loo TS, Melton LD, Mercadante D, Williams MAK, Jameson GB. In final preparation. 2014.

Characterization of charged functional domains introduced into a modified pectic homogalacturonan by an acidic plant pectin methylesterase (*Ficus awkeotsang* Makino) and modeling of enzyme mode of action, K.Yang, M.A.K. Williams, J.T.C. Tzen, G.A. Luzio, A.L. Galant, R.G. Cameron, *Food Hydrocolloids*, 39, 319-329, 2014.

Rotating angles plate diffusing wave spectroscopy, A.R. Raudsepp, A. Sutherland-Smith, M.A.K. Williams, *Journal of Nanotechnology*, 11 (5-8), 573-582, 2014.

Processive pectin methylesterases: the role of electrostatic potential, breathing motions and bond cleavage in the rectification of Brownian motions, Mercadante D, Melton LD, Jameson GB, Williams MAK, *PLoS ONE*, 9(2): e87581 (doi:10.1371/journal.pone.0087581), 2014.

Versatile multi-functionalization of protein nanofibrils for biosensor applications, Sasso, L., S. Swei, L. Domigan, J. Healy, V. Nock, M.A.K. Williams and J. Gerrard, *Nanoscale*, 6(3), 1629-1634, 2014.

Coupled solid phase extraction and microparticle-based stability and purity-indicating immunosensor for the determination of recombinant human myelin basic protein in transgenic milk, M.A. Al-Ghobashy, M.A.K. Williams, G. Laible and D.R.K. Harding, *Talanta*, 109, 7-12, 2013.

Micro-rheological behaviour and non-linear rheology of networks assembled from polysaccharides from the plant cell wall, R.R.R. Vincent, B.W. Mansel, A. Kramer, K.Kroy and M.A.K. Williams, *New Journal of Physics*, 15, 035002, 2013.

An exploration of the microrheological environment around the distal ileal villi and proximal colonic mucosa of the possum (*Trichosurus vulpecula*), Y.F. Lim, M.A.K. Williams, R.G. Lentle, P.W.M. Janssen, B.W. Mansel, S.A.J. Keen, P.Chambers, *Journal of the Royal Society Interface*, 81, 20121008, 2013.

Substrate dynamics in enzyme action: Rotations of monosaccharide subunits in the binding groove are essential for pectin methylesterase processivity, D. Mercadante, L.D. Melton, G.B. Jameson, M.A.K. Williams and A. DeSimone, *Biophysical Journal*, 8, 1731-1739, 2013.

Nanostructural modification of a model homogalacturonan with a novel pectin methylesterase: Effects of pH on nanostructure, enzyme mode of action and substrate functionality, Y. Kim, M.A.K. Williams, A.L. Galant, Luzio, G.L., Savary, B.J., Vasu, P. and R.G. Cameron, *Food Hydrocolloids*, 1, 132-141, 2013.

Stereoselective aggregation of chiral complexes with threefold-symmetric pendant carboxyl groups: an example of "perfect" self-assembly not seen in the crystalline state? J. Fischer, J.D. Hall, P.J. Patty, M.R. Waterland, M.A.K. Williams and S.J. Telfer, *RSC Advances*, 3, 12648-12654, 2013.

A practical review of microrheological techniques, B.W. Mansel, S.Keen, P.J. Patty, Y. Hemar, and M.A.K. Williams, *Rheology - New Concepts, Applications and Methods*, InTech, Edited by Rajkumar Durairaj, ISBN 978-953-51-0953-2, 2013.

Investigating the relationship between network mechanics and single-chain extension using biomimetic polysaccharide gels, E. Schuster, L. Lundin and M.A.K. Williams,

Macromolecules, 45, 4863-4869, 2012.

Innovative enzymatic approach to resolve homogalacturonans based on their methylesterification pattern Marie Ralet, Martin A.K. Williams, Abrisham Tanhatan-Nasseri, David Ropartz, Bernard Quemener, Estelle Bonnin, Biomacromolecules, 13, 1615-1624, 2012.

Bovine beta-lactoglobulin is dimeric under imitative physiological conditions: dissociation equilibrium and rate constants over the pH range of 2.5 to 7.5, D. Mercadante, L.D. Melton, G.E. Norris, T.S. Loo, M.A.K. Williams, R.C.J. Dobson, G.B. Jameson, Biophysical Journal, 103, 303-312, 2012.

Facilitating high-force single-polysaccharide stretching using covalent attachment of one end of the chain, Abdenor Fellah, Naser Belmiloud, Richard G. Haverkamp, Yacine Hemar, Don Otter and Martin A.K. Williams, Carbohydr. Polym, 87, 806-815, 2012.

Rheo-NMR studies of a nematic worm-like micelle system in a high-shear-rate regime, Chris Lepper, Parick J.B. Edwards, R. Dykstra and Martin A.K. Williams, Soft Matter, 7(21), 10291-10298, 2011.

Using SAXS to Reveal the Degree of Bundling in the Polysaccharide Junction Zones of Microrheologically Distinct Pectin Gels, Erich Schuster, Aurelie Cucheval, Leif Lundin and Martin A.K. Williams, Biomacromolecules, 12(7), 2583-2590, 2011.

Towards polysaccharide handles for single molecule experiments: Spectroscopic evidence for the selective covalent coupling of terminal sugar residues to desired substrates, Abdenor Fellah, Padmesh Anjukandi, Yacine Hemar, Don Otter and Martin A.K. Williams, Carbohydr. Polym, 86(1), 105-111, 2011.

CZE with on-line micellar sample stacking for determination of protein concentration of biopharmaceuticals, Medhat A Al-Ghobashy, Martin A.K. Williams, Gotz Laible and David R.K. Harding, Chromatographia, 73(11-12), 1145-1153, 2011.

Nanoparticles Meet Metallo-Supramolecular Chemistry: Mechanically Interlocked Gold and Silver Nanoparticles, Carl A. Otter, Philipus J. Patty, Martin A. K. Williams, Mark R. Waterland and Shane G. Telfer, Nanoscale, 3, 941, 2011.

Enzymatic modification of a model homogalacturonan with the thermally tolerant pectin methylesterase from Citrus 1. Nanostructural characterization, enzyme mode of action, and effect of pH, Randall G. Cameron, Gary A. Luzio, Prasanna Vasu, Brett J. Savary and Martin A.K. Williams, J. Agr. Food Chem., 59(6), 2717-2724, 2011.

Facilitating nanomechanical measurements on physisorbed biopolymers with automated on-the-fly monitoring of single-molecule force curves, Naser Belmiloud, Abdenor Fellah, Richard G. Haverkamp and Martin A.K. Williams, Advanced Science Letters, 4, 1-4, 2011.

Insights into the potential functionality of single-chain force-induced conformational transitions in polymer networks: Implications for polysaccharide signaling in the plant cell wall, E. Schuster, L. Lundin and M.A.K. Williams, Phys. Rev. E, 82, 5, 051927, 2010.

Rheo-NMR studies of the behaviour of a nematic liquid crystal in a low-shear-rate regime: the transition from director alignment to reorientation, C. Lepper, P.J.B. Edwards, E. Schuster, J. R. Brown, R. Dykstra, P.T. Callaghan, and M.A.K. Williams, Phys. Rev. E, 82, 4, 041712, 2010.

Extracting intramolecular sequence information from intermolecular distributions: highly non-random methylester substitution patterns in homogalacturonans generated by pectinmethylesterase, Martin A.K. Williams, Aurelie Cucheval, Abrisham Tanhatan Nasseri,

Marie-Christine Ralet, *Biomacromolecules*, 11(6), 1667-1675, 2010.

Langevin Dynamics Simulations Reveal Biologically Relevant Folds Arising from the Incorporation of a Torsional Potential, Padmesh Anjukandi, Gerald G. Pereira and Martin A. K. Williams, *Journal of Theoretical Biology*, 265(3), 245-249, 2010.

Effects of weaning and infection with *Teladorsagia circumcincta* on mucin carbohydrate profiles of early weaned lambs. V.C. Hoang, M.A.K. Williams, H.V. Simpson. *Veterinary Parasitology*, 171, 354-360, 2010.

Monosaccharide composition of fundic and duodenal mucins in sheep infected with *Haemonchus contortus* or *Teladorsagia circumcincta*. V.C. Hoang, M.A.K. Williams, H.V. Simpson, *Veterinary Parasitology*, 170, 253-261, 2010.

Rheo-NMR Studies of an Enzymatic Reaction: Evidence of a Shear-Stable Macromolecular System, P.J.B. Edwards, M. Kakubayashi, R. Dykstra, S.M. Pascal and M.A.K. Williams, *Biophysical Journal*, 98(9), 1-9, 2010.

Probing the interaction between recombinant human myelin basic protein and caseins using surface Plasmon resonance and diffusing wave spectroscopy, Medhat AlGobashy, Aurélie S.B. Cucheval, Martin A. K. Williams, Goetz Laible and D.R.K. Harding, *J Molecular Recognition*, 23, 84-92, 2010.

Determining the degree of methylesterification of pectin by ATR/FT-IR: Methodology optimisation and comparison with theoretical calculations ; A. Fellah, P. Anjukandi, M.R. Waterland and M.A.K. Williams. *Carbohydr. Polym*, 78(4), 847-853, 2009.

Multiple Particle Tracking Investigations of Acid Milk Gels using Tracer Particles with Designed Surface Chemistries and Comparison with Diffusing Wave Spectroscopy Studies Aurélie S.B. Cucheval, Romaric R. Vincent, Yacine Hemar, Don Otter, Martin A. K. Williams, *Langmuir*, 25(19), 11827-11834, 2009.

Direct measurements of interfacial interactions between pectin and κ -casein and implications for the stabilization of calcium-free casein micelle mimics, Aurélie S.B. Cucheval, M AlGobashy, Yacine Hemar, Don Otter, Martin A. K. Williams, *J. Colloid and Interface Science*, 338(2), 450-462, 2009.

Electrophoretic behaviour of co-polymeric galacturonans including comments on the information content of the intermolecular charge distribution, Martin A.K. Williams, Aurelie Cucheval, Anna Ström, Marie-Christine Ralet, *Biomacromolecules*, 10(6), 1523-1531, 2009.

Microrheological investigations give insights into the microstructure and functionality of pectin gels, Romaric R. Vincent and Martin A. K. Williams, *Carbohydr. Res.*, 344(14), 1863-1871, 2009.

Bio-inspired network optimization in soft materials - Insights from the plant cell wall, R.R. Vincent, A.Cucheval, Y.Hemar and M.A.K.Williams, *Eur Phys J E*, 28(1), 79-87, 2009.

On-line casein micelle disruption for downstream purification of recombinant human myelin basic protein produced in the milk of transgenic cows, M.A. Al-Ghobashy, M.A.K. Williams, B. Brophy et al., *Journal of Chromatography B- Analytical Technologies in Biomedical and the Life Sciences*, 877(16-17), 1667-1677, 2009.

Diffusing wave spectroscopy investigations of acid milk gels containing pectin, A. Cucheval R.R. Vincent Y. Hemar, D. Otter and M.A.K. Williams. *Colloid and Polymer Science*, 287(6), 695-704, 2009.

Factors affecting the performance of capillary isoelectric focusing in dynamically coated

capillaries using polyethylene oxide. M.A. Al-Ghobashy, M.A.K. Williams and D.R.K. Harding, *Analytical Letters*, 41, 1-18, 2008.

Demethylation of a model homogalacturonan with a salt-independent pectin methylesterase from citrus: I. Effect of pH on demethylated block size, block number and enzyme mode of action. R.G. Cameron, G.A. Luzio, K. Goodner and M.A.K. Williams, *Carbohydr. Polym.*, 71 (2), 287-299, 2008.

Stretching single polysaccharide molecules using AFM: A potential method for the investigation of the intermolecular uronate distribution of alginate? M.A.K. Williams, A.T. Marshall, R.G. Haverkamp, K.I. Draget, *Food Hydrocolloids*, 22, 18–23, 2008.

Microrheological studies offer insights into polysaccharide gels. M.A.K. Williams, R.R. Vincent, D.N. Pinder and Y. Hemar, *Journal of Non-Newtonian Fluid Mechanics*, 149, 63-70, 2008.

Entropic and Enthalpic Contributions to the Chair-Boat Conformational Transformation in Dextran under Single Molecule Stretching. Richard G. Haverkamp, Aaron T. Marshall and Martin A. K. Williams, *J. Phys. Chem. B*, 111, 13653-13657, 2007.

Microrheological studies reveal semiflexible networks in gels of a ubiquitous cell wall polysaccharide. R.R. Vincent, D.N. Pinder, Y. Hemar and M.A.K. Williams, *Phys. Rev. E*, 76, 031909, 2007.

Investigation of the effects of fine structure on the nanomechanical properties of pectin. M.A.K. Williams, A.T. Marshall, P.Anjukandi and R.G. Haverkamp, *Phys. Rev. E*, 76, 021927, 2007.

Model for stretching elastic biopolymers which exhibit conformational transitions. R.G. Haverkamp, A.T. Marshall and M.A.K. Williams, *Phys. Rev. E*, 75, 021907, 2007.

Influence of pectin fine structure on the mechanical properties of calcium-pectin and acid-pectin gels. A. Strom, P. Ribelles, L. Lundin, I.T. Norton, E.R. Morris and M.A.K. Williams *Biomacromolecules*, 8, 2668-2674, 2007.

Peer reviewed books, book chapters, books edited

Fine structure modification of pectin – analytical characterisation and rheological implications, A. Ström, L. Lundin, I.T. Norton, E.R. Morris and **M.A.K. Williams**, in *Gums and Stabilisers for the Food Industry 13*, ed. P.A.Williams and G.O.Phillips, Royal Society of Chemistry, Cambridge, 2006.

Refereed conference proceedings

Patents

Other forms of dissemination (reports for clients, technical reports, popular press, etc)

Presentations on Biological Physics and Nanoscience to physics and chemistry teachers, at local science centre, and on NZ radio (Our Changing World and This Way Up). Made a video presentation entitled '*Why we are all big softies*', New Zealand Stories for Year of Physics. Invited participant at '*Soft Meets Biology*' Gordon Research Conference, New England, US, August 2009. Physcast podcast and MacDiarmid Meet Our Scientists interview – available on www.biophysics.ac.nz