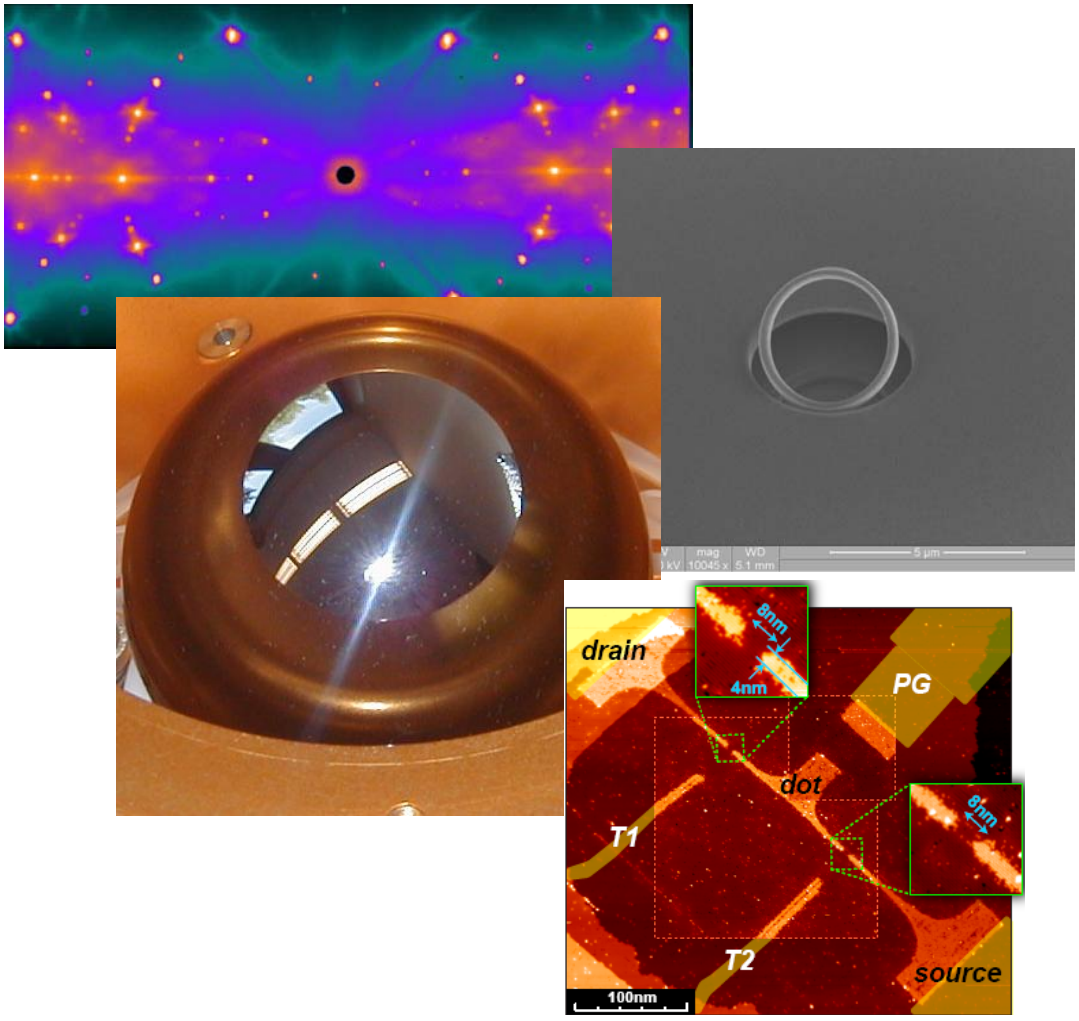
33rd Annual Condensed Matter and Materials Meeting

Wagga09



Charles Sturt University, Wagga Wagga, NSW
4 - 6 February, 2009

Proceedings of 'Wagga 2009'

The 33rd Annual Condensed Matter and Materials Meeting

ISBN: 978-0-646-50975-4

Editors: John Cashion and Trevor Finlayson

The **33rd Annual Condensed Matter and Materials Meeting** was held at Charles Sturt University, Wagga Wagga, N.S.W. from **4 – 6 February, 2009**. There were 102 attendees including seven from overseas. Nine invited and 23 contributed oral papers were presented during the two and one half days of scientific sessions, together with two sessions each consisting of 34 poster presentations. The program is included below. Every presenter was invited to submit a manuscript (six pages for invited papers and four for contributed papers) and these were refereed by at least two anonymous reviewers who worked to a set of review guidelines made available by the editorial group. The organizers would like to thank the 36 reviewers for their time and effort in reviewing manuscripts which resulted in 25 papers being accepted for publication. The accepted manuscripts are available via a hyperlink on the paper number within the program below.

Organising Committee:

Tim Bastow and Maureen Rendall (CSIRO Materials Science & Engineering)
John Cashion and Andrew Smith (Monash University)
Gary Bryant (Royal Melbourne Institute of Technology)
Trevor Finlayson (University of Melbourne)

Conference Program

Wednesday Morning, 4 February

W1 Ultracold Quantum Gases: Where Atomic Physics and Condensed Matter Physics Converge *Peter Hannaford, Swinburne University of Technology* ***INVITED***

W2 Ultrafast Interactions in Condensed Matter as Source of Terahertz-frequency Electromagnetic Radiation *Stuart Hargraves, University of Wollongong*

W3 Self-consistent Spin-Wave Theory for the Magnetic Excitations in Pnictides *Götz Uhrig, University of New South Wales & University of Dortmund*

W4 The Effect of Magnetic Field Orientation on the Zeeman Spin-splitting in Hole Quantum Wires Formed in (100) GaAs Heterostructure *Jason Chen, University of New South Wales*

W5 The Avogadro Project: Towards a New Definition of the Kilogram *Malcolm Gray, National Measurement Institute* ***INVITED***

W6 Bulk Amorphous Hard Magnets. What's interesting? *Stephen Collocott, CSIRO Materials Science and Engineering*

W7 Magnetic Domain-wall Pinning Generated by the Stray Field of a Ferromagnetic Dot Array *Peter Metaxas, University of Western Australia*

W8 What's Happened to Synroc? *Lou Vance, Institute of Materials Engineering, ANSTO* ***INVITED***

Wednesday Afternoon, 4 February

W9 Control and Readout of the Electron Spin of Individual Atoms in Silicon *Andrea Morello, University of New South Wales* ***INVITED***

W10 Methods for Improving the Activation Levels of Near Surface Implanted Phosphorus Donors in Silicon *Natasa Bulatovic, Australian Defence Force Academy, UNSW*

W11 Determining the Optical Properties of Nanostructured Films from Diffuse Reflectance Measurements *Tony Murphy, CSIRO Materials Science and Engineering*

W12 An Improved Spin Sub-level Model of the NV centre in Diamond Reconciles Inconsistent Data *Lachlan Rogers, Australian National University*

Wednesday Poster Session

Poster #	Authors	Title
WP1	J.D. Cashion and W.P. Gates	Cation Neighbour Preferences in Clay Minerals
WP2	R.L. Ahlefeldt, M.P. Hedges, A. Smith and M J. Sellars	Influence of Ligand Isotopes on the $^7F_0$-$^5D_0$ Transition of Eu^{3+} in $EuCl_3.6H_2O$
WP3	M.H.N. Al Assadi, Y. B. Zhang and S. Li	Magnetizing (Zn,Co)O $(10\bar{1}0)$ Thin Films by N Codoping, an Ab-initio Study
WP4	A. Fabricio Albuquerque, Chris J. Hamer and Jaan Oitmaa	Quantum Phase Diagram for a Planar Pyrochlore Antiferromagnet
WP5	Nicola Asquith, Susan Graham, Justin King-Lacroix, Anton P.J. Stampfl, Ivan Kempson, Liang-Jen Fan, Yaw-Wen Yang, Bol-Wen Yang, Yeukuang Hwu and Jason Chang	The Electronic Structure of Some Natural Amino-acids Determined by Synchrotron-based Photoemission
WP6	T.J. Bastow and A. Trinchi	NMR Analysis of Ferromagnets: Fe oxides
WP7	J. Bertinshaw, R. Aughterson, G. Thorogood, K. Short and K.R. Whittle	Radiation Damage in Anatase and Rutile with Impurities
WP8	C.S. Kealley, V. Bhatia, G.J. Thorogood , M.M. Elcombe and M.B. Cortie	Structure Determination of Gold-Based Shape Memory Alloy
WP9	Peter Brigden, John D. Riley, Nicholas Loh, Justin King-Lacroix, Kuangying Hsieh, Dehong Yu, Anton P.J. Stampfl, Robert Stamps, Jih-Young Yuh, Tun-Wen Pi, Wei-Bin Su, Yeukung Hwu and Jason Chang	The Growth of Mn on Cu(100): A photoemission study
WP10	D.J. Miller	Weak Measurements on Entangled Solid-State Qubits
WP11	Damien J. Carter, Oliver Warschkow, Nigel A. Marks, and David R. McKenzie	Electronic Structure Models of Phosphorus δ-Doped Silicon
WP12	Kris Frost, Edmund Lascaris and R.A. Shanks	Sol-Gel Formation of Thermoplastic Starch–Silica Nanocomposites using Reactive Extrusion
WP13	H.Y. Chen and N. Savvides	Thermoelectric Properties and Microstructure of Ag-doped Mg_2Sn
WP14	M.D. Holt, O.P. Sushkov and G.S. Uhrig	Temperature Dependence of the Spin-Wave Gap in the Superconducting Pnictides
WP15	Huan Yao (Peter) Huang, Balaji Rengarajan, Robert Shanks	Elasticity, Toughening and Damping Enhancement of Polypropylene after Blending with Polysiloxane Elastomers
WP16	J.L. Wang, S.J. Campbell, A.J. Studer, S.J. Kennedy, R. Zeng and S.X. Dou	Magnetic Structures and Magnetovolume Effects in $Ho_2Fe_{17-x}Mn_x$

WP17	Klaus-Dieter Liss, Ulf Garbe, Thomas Schambron, Jonathan Almer, HuiJun Li, Kun Yan and Rian Dippenaar	Direct, Time-resolved In-situ Observation of Dynamic Recrystallization and Related Phenomena in the Bulk of Zirconium Alloy
WP18	Nicholas A. Loh, Justin King-Lacroix, Dehong Yu, Robert Robertson, Anton P.J. Stampfl, Robert L. Stamps, Yuan-Chieh Tseng and Daniel Haskel	The Magnetism of CrO_2 under High Pressure
WP19	A. Malik, K. Belay, D. Llewellyn, W.D. Hutchison and R. Elliman	Ion Beam Assisted Deformation of Magnetic Nano-particles
WP20	Roger McMurtrie, Lachlan J Rogers, Seiji Armstrong and Neil B Manson	Spin Polarization Induced Variation in the Emission Intensity of Nitrogen Vacancy Centres in Diamond
WP21	P.J. Metaxas, R.L. Stamps, J.P.Jamet, J. Ferré, B. Rodmacq and P. Politi	Dynamically Bound Magnetic Domain Walls in a Pt/Co Multilayer
WP22	Petra A. Probst and Gerard J.J.B. de Groot	Premagnetisation of Stainless Steel Particles for Metal-in-food Detection
WP23	K. Radhanpura, S. Hargreaves and R.A. Lewis	The Generation of Terahertz Frequency Radiation by Optical Rectification
WP24	A.E. Smith	First Principles Calculations of Stacking Faults for Titanium
WP25	T. Söhnel, P-Z. Si, C. Ling and F.E. Wagner	Crystal Structure, Properties and Neutron Diffraction Studies of $RuSn_6[MO_4]O_4$ (M = Mn, Fe, Co, Zn)
WP26	H.A. Salama and G.A. Stewart	Influence of Fe on the Magnetic Properties of h-$Yb(Mn_{1-x}Fe_x)O_3$
WP27	H.A. Salama and G.A. Stewart	Exchange-induced Tm Magnetism in Multiferroic h-$TmMnO_3$
WP28	Oleg P. Sushkov	Spin Spirals in Underdoped Cuprates LSCO and YBCO: differences and similarities
WP29	Gordon J.Troup, David Paganin and Andrew Smith	Special Relativity and Spontaneous Emission of Radiation
WP30	Y. Liu and Ray. L. Withers	Relaxor Behaviors of Complex Cubic Pyrochlores
WP31	Nan Zeng and Anthony B. Murphy	Heat Generation in Gold Nanoparticle Clusters under Light Irradiation
WP32	B. Nguyen, Y. Liu, Ray L. Withers	Preparation, Structure and Dielectric Properties of Non-Bismuth $(Ca_{1.5}Ti_{0.5})(NbTi)O_7$ Cubic Pyrochlore
WP33	Y. Hancock and T.R. Finlayson	Invar-like Thermal Expansion Behaviour of Magnetite
WP34	P.A. Wattersin, N. Savvides and H. Lovatt	Parabolic Trough Solar Mirrors by Plate Bending

Thursday Morning, 5 February

T1 Soft Matter Thin Films *Anita Hill, CSIRO Materials Science and Engineering* ***INVITED***

T2 Microscopic Basis for Viscoelasticity in Solids *Stephen Williams, Australian National University*

T3 Membrane Damage during Dehydration – the Protective Role of Sugar *Ben Kent, Royal Melbourne Institute of Technology*

T4 Measuring the Work of Stretching a Single DNA Molecule and the Hydrodynamic Mobility of Colloids near Interfaces using Optical Tweezers *Edie Sevick, Australian National University*

T5 Solidification: Perspectives from Experiments on Colloidal Suspensions with Hard-sphere-like Interactions *Bill van Megen, Royal Melbourne Institute of Technology* ***INVITED***

T6 Ageing Behaviour of Colloidal Suspensions with Hard Sphere-like Interactions *Vincent Martinez, Royal Melbourne Institute of Technology*

T7 Shifts in Equilibrium due to Temperature Changes - Le Chatelier's Principle and the Fluctuation Theorem *Debra Searles, Griffith University*

T8 The Formation of Tension Wood in an Acacia Species and its Effect on Cellulose Crystal structure *Kevin Jarrett, Curtin University*

Thursday Afternoon, 5 February

T9 Fluctuation Theorems and Thermodynamics *Denis Evans, Australian National University* ***INVITED***

T10 Left-hand Properties of Conductive-fiber Filled Epoxy *Zhou Xu, Xian Jiaotong University, China*

T11 Lanthanide Titanates – Atypical Co-ordination and Stuffed Pyrochlores? *Karl Whittle, Institute of Materials Engineering, ANSTO*

T12 The Electronic Structure of a Two-dimensional Crystalline Protein: the S-layer of *Lactobacillus brevis* *Susan Graham, Bragg Institute, ANSTO*

ThursdayPoster Session

Poster #	Authors	Title
TP1	Karyn Wilde, Nicola L. Asquith, Susan M. Graham, Peter Holden, Anton P.J. Stampfl, Ivan Kempson, Bol-Wen Yang and Yeukuang Hwu	Bacterial Nano-particle Uptake under Extreme White-beam Irradiation Conditions
TP2	A.P.J. Stampfl, N. Loh, K.-Y. Hsieh, D.H. Yu, P. Brigden, Petar Stojanov, John D. Riley, R.L. Stamps, J.-Y. Yuh T.-W. Pi, J. Chang and Yeukuang Hwu	The Fermi Surface of Cu_3Mn {100} and Spin-glass Magnetism
TP3	J.G. Bartholomew, M.P. Hedges and M.J. Sellars	Cavity Based Approach to Single Rare Earth Ion Quantum Processing
TP4	Chang Woo Ohk and Wang-cheol Zin	Behavior of Evaporation and Spreading Around NaCl Droplets on the Surface of Electro-galvanized Steel
TP5	S.-W. Moon and W.-C. Zin	Crystalline Morphology of Poly (ethylene oxide) in Thin Film
TP6	S.J. Brookes, D.J. Searles and K.P. Travis	Confinement Effects on the Kinetics of the Isomerization of n-Butane
TP7	G.P. Cousland, A.E. Smith, J.D. Riley and A.P.J. Stampfl	Low Energy Photoelectron Diffraction at High Angular Resolution as a Surface Structure Probe
TP8	S.A. Danilkin, M. Avdeev, A. Studer, C. Ling, R. Macquart, M. Russina and Z. Izaola	Diffuse Scattering and QENS Study of Copper Chalcogenides
TP9	P. Dayal, N. Savvides and M. Hoffman	Hardness Enhancement in Epitaxial Nanolayered Al/Pd Thin Film
TP10	Kris Frost, Edmund Lascaris and R.A. Shanks	Grafting of Thermoplastic Starch with Reactive Dyes using Reactive Extrusion to Form Sheets with Reduced Retrogradation
TP11	C.J. Garvey, R.A. Russell, V.M. Garamus, F. Boué, L.R.J. Foster and P.J. Holden	Small Angle Neutron Scattering Study of the Interface between Ethylcellulose/Polyhydroxy-butyrate Blends during Annealing
TP12	Huan Yao (Peter) Huang, Balaji Rengarajan, Robert Shanks	Static, Dynamic and Modulated Thermomechanical Behaviour of Toughened Polypropylene Composites
TP13	L.Y.S. Soo, W.D. Hutchison, Y. Tajiri and K. Nishimura	Exploring the Magnetic Anisotropy of $(Pr_{0.5}Nd_{0.5})_{1-x}Gd_xNi$
TP14	J.B. Xu, Y. Liu and R.L.Withers	Structure and Electrical Characteristics of $Na_{0.5}Bi_{0.5}TiO_3$ Thin Films
TP15	J.L. Wang, S.J. Campbell, M. Hofmann, S.J. Kennedy, R. Zeng and S.X. Dou	Magnetocaloric Effect and Phase Transitions in $PrMn_2Ge_{2-x}Si_x$
TP16	J.C. Knott and R.A. Lewis	Studies of the Electroresistive Properties of Electronic Oxides

TP17	I. Laird	Heating up the Fight against Global Warming: Parabolic Trough based Thermoelectric Generator
TP18	Thomas Lenné, Christopher J. Garvey, Karen L. Koster and Gary Bryant	The Effects of Solutes on the Gel-Fluid Transition of Phospholipid Bilayers: Experimental Results and Theoretical Model
TP19	Klaus-Dieter Liss	Do *Q*!
TP20	Nicholas Loh, Thomas Saerbeck, Mannan Ali, Dieter Lott, Anton P. J. Stampfl, B.J. Hickey, B.P. Toperverg, A. Mulders, Robert L. Stamps and Frank Klose	Onset of Biquadratic Coupling in Co/CuMn multilayers studied with Polarised Neutron Reflectivity
TP21	R. Mahjoub, A. Varatharajan and V. Nagarajan	Theoretical Investigation of Ferroelectric Bilayers
TP22	Anwaar Malik	Carbon Cluster Output of Cesium-sputtering Ion Sources with Modified Cathode Geometries
TP23	Petra A. Probst and Gerard J.J.B. de Groot	Vibration Characterisation and Reduction of a Joule-Thomson Cryocooler using a HTS SQUID
TP24	M.N. Read	Surface Electron Band Structure and VLEED Reflectivity for Al(111)
TP25	Nick Savvides, Glen Prout and Howard Lovatt	Thermoelectric Conversion of Waste Heat in Aluminium Smelters
TP26	S. Spoljaric, A. Genovese, T.K. Goh, G. Qiao and R.A. Shanks	Annealing and Thermal History Relaxations of Polymer Nanocomposites with Hyperbranched Polymer Particles
TP27	S. Spoljaric, A. Genovese, G. Qiao and R.A. Shanks	Temperature, Structural and Relaxation Asymmetry **C**ontributions to Physical Ageing of Polymer–Silica Nanocomposites
TP28	Julie L. Murison, Nicola L. Asquith, Anton P.J. Stampfl, Tun-Wen Pi, Yaw-Wen Yang, Yao-Chang Lee and Yeukuang Hwu	The Adsorption of Glycine on Alumina: Surface complexation and polymerisation
TP29	B. Saensunon, K. Nishimura and G.A. Stewart	The Magnetic Ground State of Tm^{3+} Site in $TmMn_2Si_2$
TP30	Gordon J. Troup, Ruth Oliver, Laura O'Dea, John Boas, and Steven J. Langford	Green Ginger Wine: EPR and Antioxidant Efficiency Studies
TP31	W. Chen and O.P. Sushkov	Strong Coupling Superconductivity Mediated by Spin-Wave Exchange in Cuprates
TP32	Zhiguo Yi, Yongxiang Li, Yun Liu and Ray L Withers	La Doping Effects in Intergrowth Bismuth Layer Structured Ferroelectrics
TP33	E. Constable, Y. Hu, J. Horvat and R.A. Lewis	The Emission of Visible Radiation by Peeling Adhesive Tape
TP34	Jaan Oitmaa and A. Fabricio Albuquerque	Thermodynamics of the Ferro-Antiferro J1-J2 Spin 1/2 Chain Materials

Friday Morning, 6 February

F1 Light-weight Structural Materials Beyond Conventional Alloys *John Banhart, Helmholtz Centre, Germany* ***INVITED***

F2 From the Single Grain to Texture *Kun Yan, Bragg Institute, ANSTO*

F3 Critical Behaviour of Structure Factors at a Quantum Phase Transition *Chris Hamer, University of New South Wales*

F4 The Chemical Transport and the Crystal and Electronic Structure of Ternary and Quaternary Copper Antimony Oxides *Tilo Söhnel, University of Auckland*

F5 The Preferred Quantum Phase Transitions in Coupled Quantum Optical Cavities *Andrew Greentree, University of Melbourne* ***INVITED***

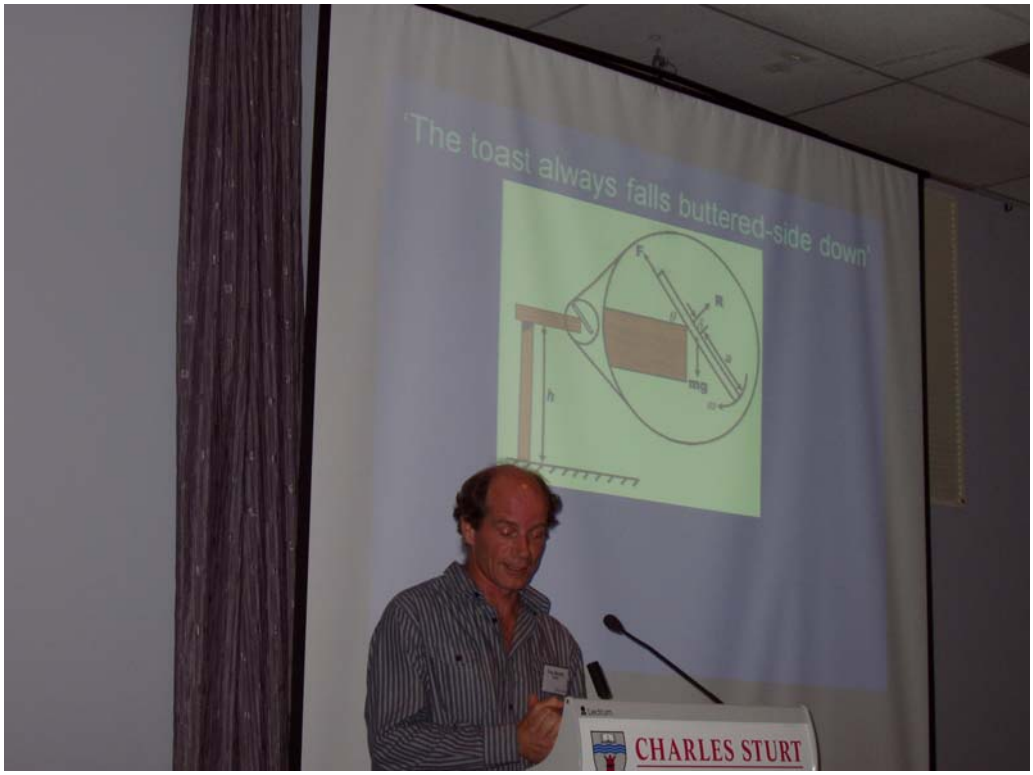
F6 The Fermi Surface of Cu_3Mn {100} and Spin-glass Magnetism *Richard Clements, Bragg Institute, ANSTO*

F7 Ferromagnetic Behavior in Antiferromagnetic Mn-containing Oxide Nanoparticles *Ping-Zhan Si, University of Auckland and China Jiliang University*

F8 Aging Phenomena in the $Au_7Al_5Cu_4$ Shape Memory Compound *Vijay Bhatia, University of Technology Sydney*

Some conference highlights

Mike Cortie and Peter Hannaford start off the Meeting



Tony Murphy explains one of the mysteries of condensed matter

John Dunlop, Paul Gwan and Trevor Finlayson (L to R) officiate at the Trivia Quiz

Tim Bastow presents “Jacko” to Klaus-Dieter Liss for the most intriguing title and for enlivening question times