



The Australian and New Zealand
Magnetic Resonance Society

2015 CONFERENCE

29 November – 3 December 2015 • Copthorne Hotel and Resort • Bay of Islands • New Zealand

Tuesday 1 December 2015

08.30 – 17.30	Registration Desk Open		Treaty Room Foyer
09.00 – 10.30	Imaging in Physiology, Psychology and Medicine I – Chair: Caroline Rae		Treaty Room
	09.00 – 09.30	I-07: TOWARDS AN UNDERSTANDING OF RADIATION NECROSIS AND ITS TREATMENT: LESSONS FROM A PRECLINICAL MODEL Joel Garbow	
	09.30 – 09.45	O-16: LIVER STIFFNESS IN PEDIATRIC SUBJECTS IS LOWER THAN IN ADULTS, AND INCREASES WITH AGE: A MULTIFREQUENCY MR ELASTOGRAPHY STUDY Lynne Bilston	
	09.45 – 10.00	O-17: FAST UNWRAPPING USING DISCRETE GRADIENT EVALUATION (FUDGE): ANALYTICAL CORRECTION TO THE LAPLACIAN-BASED PHASE UNWRAPPING TECHNIQUE Amanda Ng	
	10.00 – 10.15	O-18: EFFICIENT NUMERICAL INTEGRATION OF THE BLOCH EQUATIONS WITH OFF-RESONANCES Leigh Johnston	
	10.15 – 10.30	O-19: DEVELOPMENT AND CHARACTERISATION OF ADVANCED MRI CONTRAST AGENTS Bill Price	
10.30 – 11.00	Morning Tea		Waitaha Events Centre
11.00 – 12.15	Solids, Membranes and Complexes – Chair: Daniel Gunzelmann		Treaty Room
	11.00 – 11.30	I-08: A MULTINUCLEAR SOLID STATE NMR AND GIPAW DFT APPROACH TOWARDS THE EVALUATION OF THE PROPOSED STRUCTURAL MOTIFS OF VATERITE John Hanna	
	11.30 – 11.45	O-20: PROTEIN STRUCTURE AND LIPID INTERACTIONS IN INFLUENZA BUDDING STUDIED BY SOLUTION-STATE NMR Jolyon Claridge	
	11.45 – 12.00	O-21: WHAT CAN SSNMR TELL US ABOUT THE STRUCTURE, ASSEMBLY AND INTERACTIONS OF A FUNCTIONAL AMYLOID FROM FUNGI? Ann Kwan	
	12.00 – 12.15	O-22: CALCULATION OF ¹⁷ O NMR SHIFTS OF POLYOXOMETALATES C. André Ohlin	
12.15 – 13.30	Lunch (NNNA Meeting at 12.45)		Waitaha Events Centre
13.30 – 15.00	Natural and Novel Materials – Chair: Steffen Merz		Treaty Room
	13.30 – 14.00	I-09: SURPRISING STRUCTURAL DETAIL AND BIOLOGICAL INSIGHT FROM NMR OF COMPLEX NATURAL POLYMER MIXTURES (PLANT CELL WALLS) John Ralph	
	14.00 – 14.15	O-23: IN SITU MRI OF SOLID STATE ELECTROLYTES BASED ON IONIC PLASTIC CRYSTALS Konstantin Romanenko	
	14.15 – 14.30	O-24: MAGNETIC RESONANCE ROCK CORE ANALYSIS AT RESERVOIR-LIKE CONDITIONS Huabin Liu	
	14.30 – 14.45	O-25: ELUCIDATION OF THE CHEMICAL AND MORPHOLOGICAL STRUCTURE OF DOUBLE NETWORK (DN) HYDROGELS BY HIGH RESOLUTION MAGIC ANGLE SPINNING (HRMAS) NMR Pavletta Shestakova	
	14.45 – 15.00	O-26: MOLECULAR STRUCTURE OF CONDENSED CARBON MATERIALS Aditya Rawal	

Elucidation of the Chemical and Morphological Structure of Double Network (DN) Hydrogels by High Resolution Magic Angle Spinning (HRMAS) NMR

Pavletta SHESTAKOVA,¹ Rudolph WILLEM,² Elena VASSILEVA³

¹*NMR Laboratory, Institute of Organic Chemistry with Centre of Phytochemistry, BAS
Acad. G. Bontchev Str., Bl.9, Sofia 1113, Bulgari; e-mail: psd@orgchm.bas.bg*

²*Department of Materials and Chemistry (MACH), Vrije Universiteit Brussel, Pleinlaan 2, B-1050
Brussels, Belgium*

³*Faculty of Chemistry, Sofia University, 1 James Bourchier Blvd., Sofia 1164, Bulgaria*

Polymeric hydrogels are materials with high swelling capacity in water, and with promising potentials to advanced pharmaceutical applications (gastric retention, controlled drug delivery) as well as in the field of tissue engineering and regenerative medicine (as scaffolds, tissue culture media). The main drawback of hydrogels is their poor to medium mechanical performance limiting their even wider practical applications. Exceptions are the Double Network (DN) hydrogels displaying extremely high toughness and remarkable mechanical properties.

In our study HRMAS NMR was applied to gain insight at molecular level into the structure of DN hydrogels prepared from poly(2-acrylamido-2-methyl-1-propanesulfonic acid) (PAMPS) and poly(acrylamide) (PAAm), with different ratios of the two polymers, using N,N'-methylene *bis*(acrylamide) (MBAA) as a cross-linker. Diffusion filtered ¹H spectra, ²H, ¹³C, HSQC and ROESY spectra were used to investigate the influence of chemical composition on structure and dynamic properties of the DN. The analysis of the HRMAS NMR data of PAMPS/PAAm hydrogels prepared with increasing AAm concentration shows the formation of covalent bonds between the two polymer networks through the non-reacted double bonds of the cross-linker MBAA. Evidence to the existence of strong hydrogen bond network between the side chain fragments based on N-H group of the PAMPS as hydrogen bond donor and C=O group of the PAAm as hydrogen acceptor is provided by characteristic ROESY cross-peaks. These findings contribute to clarify important questions about the molecular origin and interactions responsible for the exceptional mechanical properties of the DN hydrogels.

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Certificate of Attendance

**THE AUSTRALIAN AND NEW ZEALAND MAGNETIC
RESONANCE SOCIETY 2015**

29 November - 3 December 2015

Professor Pavletta Shestakova

The above individual has attended the Australian and New Zealand Magnetic Resonance Society Conference which was held at the the Copthorne Resort Bay of Islands in New Zealand. The conference programme ran from Sunday 29th to Thursday 3rd December 2015.

Signature of ANZMAG 2015 Conference Chair:

Petrik Galvosas
Victoria University of Wellington

Date: 3rd December