

The cover shows the surface texture of a catanionic formulation and hints at their extraordinary rigidity, as reported by Zemb and Dubois (p. 971).

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Guest Editorial

Australian Colloid and Interface Symposium Special Issue

Greg Warr, Bob Hunter

Aust. J. Chem. **2003**, *56*, 957–958.



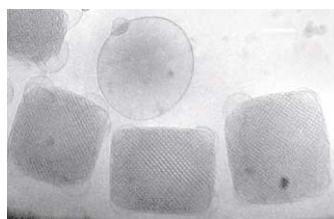
Nanotechnology, biotechnology, formulations, mineral processing—themes of the ACIS meeting in Sydney. The wide scope of colloid and interface science was expanded further in this meeting with the Australia–Japan symposium, held simultaneously.

Reviews

Alexander Lecture 2003: Cubosomes, Vesicles, and Perforated Bilayers in Aqueous Systems of Lipids, Polymers, and Surfactants

Mats Almgren

Aust. J. Chem. **2003**, *56*, 959–970.

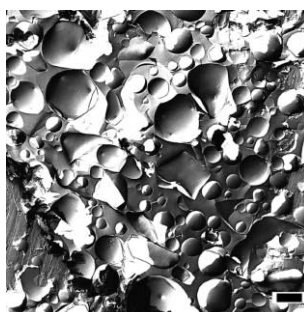


Cryo transmission electron microscopy has proven its value in investigations of the size and morphology of various liposomal and vesicular systems. Combined with scattering methods, good measures of size and polydispersity can be obtained for defined systems. This combination of techniques has been applied to vesicles, revealing them to be uni- or multilamellar, as open structures or closed defect-free forms, and spherical, tubular, or oblate in shape.

Catanionic Microcrystals: Organic Platelets, Gigadalton ‘Molecules’, or Ionic Solids?

Thomas Zemb, Monique Dubois

Aust. J. Chem. **2003**, *56*, 971–979.

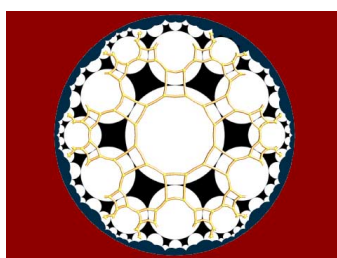


Catanionics—a mixture of anionic and cationic surfactants dispersed in water or oil—can undergo a reversible micelle-to-vesicle transitions (an image of the vesicle form is shown), which may be controlled with an understanding of their phase diagrams, salt effects, and liquid-crystal-like chain melting. The vesicles themselves aggregate to nanodiscs to icosahedra but, as alluded to by the title, their very nature remains unclear.

Meditation on an Engraving of Fricke and Klein (The Modular Group and Geometrical Chemistry)

*Stephen T. Hyde, Ann-Kristin Larsson,
Tiziana Di Matteo, Stuart Ramsden,
Vanessa Robins*

Aust. J. Chem. **2003**, *56*, 981–1000.



Chemical structures are described in numerous ways. Atomic and molecular crystals are typically modelled as polyhedral arrays, sphere packings and nets, while liquid crystals are comprehended as curved surfaces. These many types of three-dimensional Euclidean forms can be seen to be projections of (simpler) two-dimensional arrays, found in hyperbolic space.

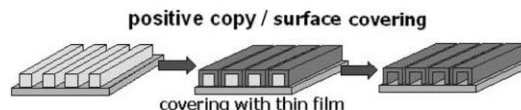
Current Chemistry

Nanocopying as a Means of 3D Nanofabrication: Scope and Prospects

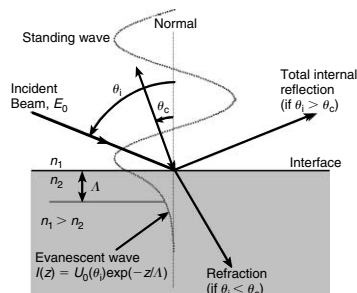
Toyoki Kunitake, Shigenori Fujikawa

Aust. J. Chem. **2003**, 56, 1001–1003.

The use of nanosized templates to fabricate three-dimensional architectures in the nanometer regime is still a largely unexplored field of nanotechnology. Positive and negative copying of molecules and nanosized objects by the surface sol–gel process is useful for this purpose. The authors here give an account of the techniques available to date, along with their advantages and disadvantages.

**Shedding Light on the Conformation of Proteins and Other Macromolecules at an Interface**

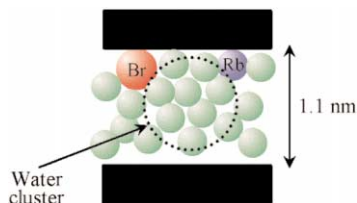
Michelle L. Gee, Trevor A. Smith

Aust. J. Chem. **2003**, 56, 1005–1012.

The adsorption of macromolecules such as proteins and polyelectrolytes at an interface disrupts the finely tuned balance of inter- and intramolecular interactions which determine their solution conformations. This disruption is a key to protein structure–function behaviour in, for example, receptor–donor interactions at a cell surface. Surprisingly, little is known about protein interfacial conformation. Evanescent wave based techniques are described here, that allow the profiling of proteins and polyelectrolytes through both absorbing and fluorescent moieties.

Nanosolution as a New Turn of Nanoconfinement for Fluids

Takahiro Ohkubo, Hirofumi Kanoh, Katsumi Kaneko

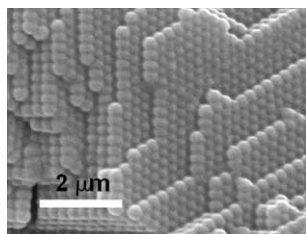
Aust. J. Chem. **2003**, 56, 1013–1016.

This article summarizes the properties and structures of molecules confined in nanospaces, and reports on the pioneering work conducted into the structures of nanoscale ionic solutions ('nanosolutions'). The findings to date indicate that as a result of intense confinement effects the materials under investigation display behaviour which is significantly different to that observed normally.

Rapid Communications

Formation of Large Opals via Drying of Wet Colloidal Crystals

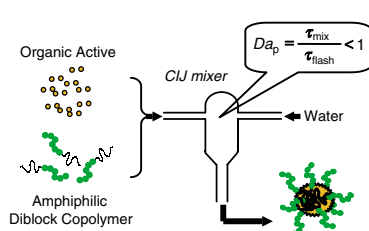
Verónica Salgueiriño-Maceira, Benito Rodríguez-González, Thomas Hellweg, Luis M. Liz-Marzán

Aust. J. Chem. **2003**, 56, 1017–1020.

Colloidal self-assembly is a method available to prepare photonic crystals, but the method tends to produce relatively small crystalline domains. Reported here is a simple wet-chemical procedure to overcome this limitation—controlled drying allows the liquid-state order to be retained.

Flash NanoPrecipitation of Organic Actives and Block Copolymers using a Confined Impinging Jets Mixer

Brian K. Johnson, Robert K. Prud'homme

Aust. J. Chem. **2003**, 56, 1021–1024.

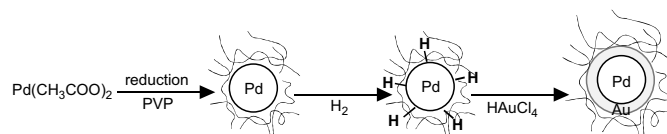
Pharmaceutical and specialty chemical formulations require submicron particles to meet a number of needs, yet few alternatives have been proposed at practical conditions. Here, the authors propose a new method to produce organic nanoparticles and initial insights into how to characterize the precipitation process.

Preparation and Catalysis of Inverted Core/Shell Structured Pd/Au Bimetallic Nanoparticles

Yukihide Shiraishi, Daisuke Ikenaga,
Naoki Toshima

Aust. J. Chem. **2003**, 56, 1025–1029.

Colloidal dispersions of PVP-protected palladium/gold (inverted core/shell) bimetallic nanoparticles were prepared by covering palladium core nanoparticles with gold atoms, by means of sacrificial hydrogen adsorbed on the palladium cores. The mean diameters of these structured materials was in the range 3–4 nm. The inverted core/shell structure was thermally metastable.



Electrostatically Controlled Interactions of Mouse Paneth Cell α -Defensins with Phospholipid Membranes

Jason E. Cummings, Donald P. Satchell,
Yoshinori Shirafuji, Andre J. Ouellette,
T. Kyle Vanderlick

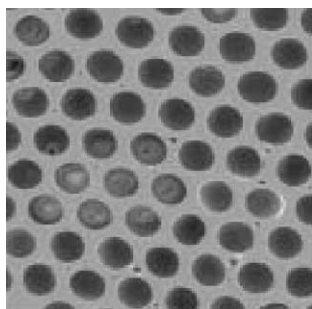
Aust. J. Chem. **2003**, 56, 1031–1034.

Interactions of cryptdin-4 with phospholipid vesicles is driven primarily by electrostatic interactions between the charged amino acid residues of the peptide sequence and the overall membrane charge of the vesicles. Both cryptdin-4 and its precursor exhibited disruptive activity against lipid membranes, inducing graded leakage of the vesicle's contents. Zeta-potential measurements revealed that this activity was greatest against highly anionic vesicles.

Biomimetic Honeycomb-Structured Surfaces Formed from Block Copolymers Incorporating Acryloyl Phosphorylcholine

Martina H. Stenzel, Thomas P. Davis

Aust. J. Chem. **2003**, 56, 1035–1038.

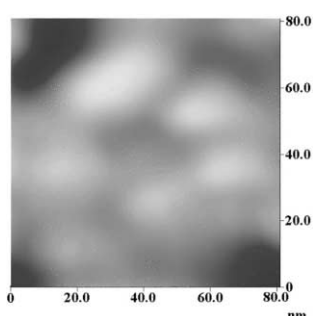


Phosphorylcholine, a constituent of phospholipids in biomembranes, was incorporated, by the formation of poly(acryloyl phosphorylcholine) (PACP), into block copolymers containing polystyrene. Biomimetic regular honeycomb-structured porous films were obtained upon casting. The pore size and regularity was dependent on block size. Initial XPS results indicated ordering of the PACP blocks around the pores due to the mechanisms of casting.

Atomic Force Microscopy Imaging of Glucose Oxidase using Chemically Modified Tips

Dusan Losic, Ken Short, Joe G. Shapter,
Justin J. Gooding

Aust. J. Chem. **2003**, 56, 1039–1043.

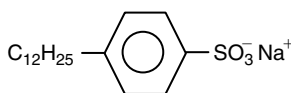


Modifying the tips of scanning probe microscopes allows for a chemical specificity otherwise unavailable to standard AFM tips. This 'tuning' dramatically increases the signal and makes topographic imaging of soft materials possible, as shown by the example of the enzyme glucose oxidase covalently bound on top of a self-assembled monolayer.

Sonochemical Degradation of Sodium Dodecylbenzene Sulfonate in Aqueous Solutions

Muthupandian Ashokkumar,
Tyson Niblett, Lyndon Tantonco,
Franz Grieser

Aust. J. Chem. **2003**, 56, 1045–1049.



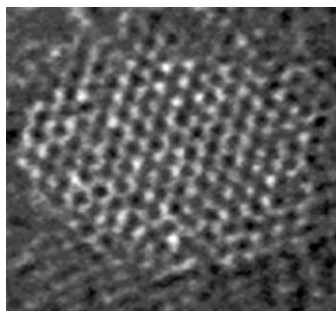
Sonication of aqueous SDBS (shown) solutions leads to its degradation, thus proving it is a viable technique for the degradation of chemical pollutants in water. Hydroxyl radicals, produced during the cavitation event, react with the surfactant molecules at the bubble/solution interface. Prolonged sonication yields water-soluble and volatile compounds. Initial degradation rates were found to be dependent on surfactant concentration.

Full Papers

Size Effects in ZnO: The Cluster to Quantum Dot Transition

Annabel Wood, Michael Giersig,
Michael Hilgendorff,
Antonio Vilas-Campos,
Luis M. Liz-Marzán, Paul Mulvaney

Aust. J. Chem. **2003**, 56, 1051–1057.

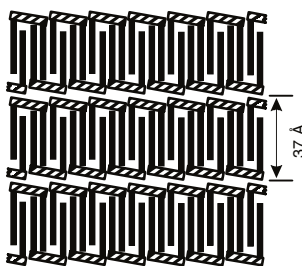


At what point do bulk properties dominate quantum effects in quantum dots? Using a new and vastly simplified procedure, highly monodisperse ZnO nanoparticles were prepared; the contributions from quantum effects were, for a given particle size, less than theory predicted. One such property, the effective masses of electrons and holes, remains constant for particles to 1 nm in diameter.

Thin Films of a Tetracationic Porphyrin

Benjamin M. D. O'Driscoll,
Jeremy L. Ruggles, Garry J. Foran,
Ian R. Gentle

Aust. J. Chem. **2003**, 56, 1059–1063.



For light harvesting or chemical sensing applications, the preparation of thin porphyrin films, where the orientation of the porphyrin is controlled, is of importance. The tetracationic zinc(II) porphyrin studied adopts a fixed interdigitated bilayer structure (illustrated) at the air/solid interface, independent of the subphase and the surface pressure of transfer.

Steric and Counterion Effects on Cationic Surfactant Self-Assembly into Micelles and Liquid Crystals

Marta A. Cassidy and Gregory G. Warr

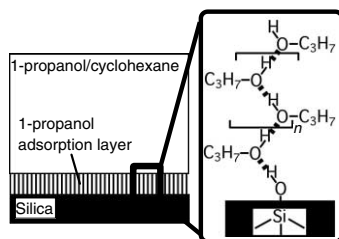
Aust. J. Chem. **2003**, 56, 1065–1070.

The aggregate morphology of surfactants depends on the area of the head group as well as the hydrophobic chain. This paper examines the effect of added salicylate counterions on the aqueous solution and phase behaviour of a series of alkylammonium bromides. The bulky head groups alter the steric interactions at the micelle surface.

Hydrogen-Bonded Macrocluster Formation of 1-Propanol and 2-Propanol on Silica Surfaces

Masashi Mizukami, Kazue Kurihara

Aust. J. Chem. **2003**, 56, 1071–1080.

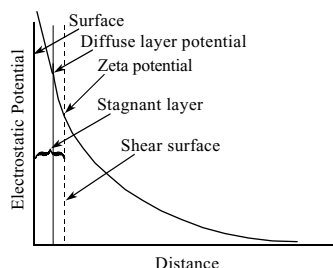


The adsorption of the two alcohols from cyclohexane on a silica surface was investigated. 1-Propanol adsorbs in the form of a linear zig-zag structure, whereas 2-propanol adsorbs in a cyclic structure. The surface silanol groups are essential for the formation of these unique structures. A long-range attraction was observed in the 1-propanol/cyclohexane binary liquids. No long-range attraction was observed in the 2-propanol/cyclohexane at 0.1–6.0 mol-%, which can be explained by its cyclic aggregation structure.

Stagnant Layer Conduction in Surfactant-Stabilized Hexadecane Emulsion Systems Measured by Electroacoustics

Alex M. Djerdjev, James K. Beattie,
Robert J. Hunter

Aust. J. Chem. **2003**, 56, 1081–1089.



An anomaly has been reported in zeta-potentials calculated from the electroacoustic behaviour of a sodium dodecyl sulfate (SDS) stabilized hexadecane emulsion. A correction, including electrical conduction in the stagnant layer behind the shear plane, eliminates this anomaly—without this correction, added salt causes the apparent droplet size to increase and the zeta-potential to show a maximum; with the correction the dynamic mobility spectra fits to a constant size distribution and the zeta-potentials shift as expected.

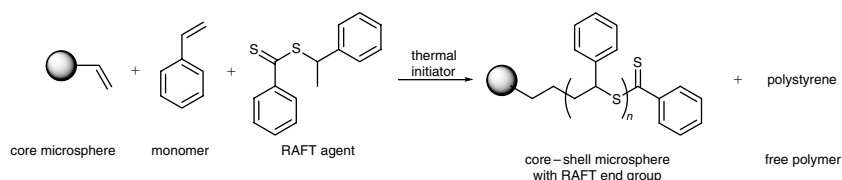
Focus

Surface Grafting via the Reversible Addition–Fragmentation Chain-Transfer (RAFT) Process: From Polypropylene Beads to Core–Shell Microspheres

Leonie Barner

Aust. J. Chem. **2003**, 56, 1091.

Although RAFT is more commonly used to produce well-defined polymers, described herein is its application to produce a uniform polymeric layer, a method highly applicable to creating core–shell nanoparticles. Of particular advantage is that the cores do not need prior modification, thereby making the procedure a one-step process.



Book Reviews

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