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Celebrating RACI and Academy of Science awards 2022–23

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It is a pleasure to present this year's special issue featuring the recipients of awards and medals issued by the Australian Academy of Science and the Royal Australian Chemical Institute.

David J. Craik (The University of Queensland), the Academy's 2023 David Craig Medal awardee, and coworkers Frøsig-Jørgensen, Ji, Gorman and Kan contribute an account on the discovery and optimisation of the toxin isolated from the marine cone shell *Conus victoriae* and analogues, which have analgesic properties comparable to that of gabapentin, one of the foremost clinically used drugs for neuropathic pain. Structure–activity relationships were investigated with extensive use of solid phase peptide synthesis. Backbone cyclisation of the conotoxin proved to be particularly effective in improving potency and pharmacological properties of the peptide, improve biological stability and reduce proteolytic degradation, and the backbone cyclisation also improved the oral bioavailability.[1]

Yu Heng Lau (The University of Sydney), the winner of an Early Career Travel Bursary, is the author of an account on the supramolecular chemistry of protein cages and viruses. Examples of protein cages include the outer capsid shells of viruses and simple organelle-like structures in bacteria that house enzymes in the interior. The account serves to introduce the world of protein cages to the chemical audience and to highlight similarity with supramolecular chemistry. It is concluded that many chemistry concepts have counterparts in molecular virology. Many of the molecular self-assembly properties and host–guest behaviours that apply to classic supramolecular systems also operate at the scale of capsid formation.[2]

George A. Koutsantonis (The University of Western Australia), the Leighton Medallist, and coworkers Jago and Gaschk contribute a tutorial Primer Review on the history and fundamentals of molecular photochromism, i.e. molecules that reversibly change colour upon exposure to light. The fundamental concepts and histories are presented, and key photochromic molecules and selected applications are provided. Advances in experimental and theoretical research have led to a thorough understanding of photochromism and enabled the rational design of photochromes for various material applications. The authors conclude that, although several types of organic photochromes have been studied extensively, numerous potential applications are waiting to be explored.[3]

Paul L. Burn (The University of Queensland), winner of the Applied Research Medal, and coworkers Hutchinson, Poliquit, Clulow, Gentle and Shaw contribute a research article on the detection of explosives containing nitro-groups by correlating vapour uptake with the luminescence quenching of poly(dendrimer)s. It was found that that the addition of first-generation biphenyl-based dendrons to one of the polymers resulted in improved photoluminescence quenching and sensitivity, whereby neutron reflectometry was applied to characterise vapour uptake.[4]

Timothy U. Connell (Deakin University), the Organometallic Awardee, and Carol Hua (The University of Melbourne) contribute a research paper on control of the emission energy in metal organic frameworks combining calcium(II) with heteroleptic iridium(III) metalloligands containing 1,2-diimine ancillary ligands and different cyclometalated linkers. The synthesised frameworks exhibit similar supramolecular structure but different emission properties depending on the cyclometalating ligand. Binding of calcium(II) to the metalloligands further affected framework emission depending on the relative contribution of triplet charge transfer or ligand-centred transitions to the emissive excited state.[5]

John A. Carver (Australian National University) was awarded a Distinguished Fellowship, and contributes together with coworkers Kumar, Cantarutti, Thorn,

Bellotti, Esposito, Wilson and Ecroyd a paper on the extracellular chaperone clusterin, which prevents primary and secondary nucleation of an amyloidogenic variant of β2-microglobulin. Accumulation of β2-microglobin in tissues is responsible for dialysis-related amyloidosis, and the D76N mutant is highly amyloidogenic. The paper describes an *in vitro* biophysical and spectroscopic investigation of D76N β2-microglobin amyloid fibril formation and its inhibition by the common extracellular chaperone, clusterin. *In vivo*, clusterin may play an important role in preventing β2-microglobin deposition.[6]

Nathan L. Kilah (University of Tasmania), the Chemical Services Awardee, and coworkers Taylor and Breadmore contribute a paper on the exploration of colourimetric detection of the harmful pollutant perfluorooctane sulfonate (PFOS) using micelle-encapsulated porphyrin host molecule as a rapid colourimetric indicator. This allowed the detection of PFOS in aqueous solutions at concentrations as low as 3 ppm and provides a simple analytical method without the use of sophisticated equipment.[7]

David A. Lewis (Flinders University), the recipient of the Weickhardt Medal for distinguished contribution to economic advancement, and coworkers McDonough, Mangos, Hassam and Campbell provide a paper on controlled particle size synthesis of functionalised siloxanes using a one-pot method. Highly monodisperse, size-controlled silica particles from 50 nm to over 1000 nm bearing thiol, vinyl, phenyl, propyl, cyanopropyl and chloropropyl substituents were synthesised from the corresponding single organosilane source. Particle growth proceeded by a conventional Stöber process, where silane monomers and oligomers add to nucleation sites. Scale-up of the homogeneous mixing approach was able to produce gram quantities of particles without affecting size, size dispersion or functionality.[8]

References

1 Frøsig-Jørgensen M, Ji J, Gorman DM, Kan M-W, Craik DJ. Discovery and optimisation of conotoxin Vc1.1 and analogues with analgesic properties. *Aust J Chem* 2023; 74(10): 655–670. doi:10.1071/CH23155
2 Lau YH. The supramolecular chemistry of protein cages and viruses. *Aust J Chem* 2023; 74(10): 671–676. doi:10.1071/CH23102
3 Jago D, Gaschk EE, Koutsantonis GA. History and fundamentals of molecular photochromism. *Aust J Chem* 2023; 74(10): 635–654. doi:10.1071/CH23115
4 Hutchinson KL, Poliquit BZ, Clulow AJ, Burn PL, Gentle IR, Shaw PE. Correlating vapour uptake with the luminescence quenching of poly(dendrimer)s for the detection of nitro group-containing explosives. *Aust J Chem* 2023; 74(10): 677–685. doi:10.1071/CH23131
5 Hua C, Connell TU. Controlling emission energy in metal–organic frameworks featuring cyclometalated iridium(III) linkers. *Aust J Chem* 2023; 74(10): 686–695. doi:10.1071/CH23127
6 Kumar M, Cantarutti C, Thorn DC, Bellotti V, Esposito G, Wilson MR, Ecroyd H, Carver JA. The extracellular chaperone clusterin prevents primary and secondary nucleation of an amyloidogenic variant of β2-microglobulin. *Aust J Chem* 2023; 74(10): 696–708. doi:10.1071/CH23082
7 Taylor CM, Breadmore MC, Kilah NL. Exploring colorimetric detection of perfluorooctane sulfonate using micelle solubilised porphyrin. *Aust J Chem* 2023; 74(10): 709–718. doi:10.1071/CH23061
8 McDonough R, Mangos D, Hassam C, Campbell JA, Lewis DA. Controlled particle size synthesis of functionalised siloxane particles using a one-pot method. *Aust J Chem* 2023; 74(10): 719–729. doi:10.1071/CH23128

Conflicts of interest. Curt Wentrup is the guet editor of this issue of the *Australian Journal of Chemistry*. The author declares that they have no further conflicts of interest.

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Biography

Curt Wentrup graduated *Candidatus Scientiarum* under K. A. Jensen, University of Copenhagen and PhD at the Australian National University with W. D. Crow, undertook post-doctorates with Hans Dahn (Univeristé de Lausanne), W. M. Jones (Gainesville) and Maitland Jones Jr (Princeton), became Maître-Assistant and Privat-Docent at Lausanne and Professor at Universität Marburg before returning to The University of Queensland as Chair of Organic Chemistry in 1985. He received a DSc from Copenhagen, an honorary doctorate from Pau, France, a Fellowship of the Australian Academy of Science, and the Australian Centenary, Craig, Birch and Leighton Medals. As emeritus professor, he continues research in organic, physical and historical chemistry.