Advances of 12th CAPS research symposium: young chemists and chemical engineers fronts

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Collaborations between China and Australia has always been crossed at almost all fields covering mathematics and physics, computer sciences and IT, chemistry, chemical engineering and materials, economics, business and management, mechanical, electrical and electronic engineering, social sciences and humanities, biomedical and health sciences, civil, environmental and agricultural engineering, etc.

This special edition, in collaboration with the *Frontiers of Chemical Science and Engineering*, is a collection of excellent papers focusing on the topic of 'Chemistry, Chemical Engineering and Materials', mainly from the 12th CAPS Research Symposium. These papers have been peer-reviewed by more than 40 professional reviewers from 7 countries. After rigorous consideration, 13 papers were accepted for publication including 2 Views & Comments, 1 Reviews, and 10 Research Articles. The research area covers both traditional and novel concepts in the field of Chemistry, Chemical Engineering and Materials. Specific topics include hydrometallurgy [1], solvent extraction [2], adsorption [3–5], membranes [6,7], process modelling [8,9], microfluidics [10], synthetic chemistry [11], block copolymers [12] and gas sensors [13]. Hereby, the work by Jian et al. [13] was selected as the cover of this special issue. This work addresses the utilization of a two-dimensional (2D) materials with ultra-thin $\text{Ti}_3\text{C}_2\text{T}_x$ MXene, as a family of ideal gas sensor working at room temperatures. Two critical features, i.e., the thickness of MXene films, and the scope of the analytes, are elaborated towards $\text{Ti}_3\text{C}_2\text{T}_x$ MXene based gas sensors after characterizing their sensing performance toward reducing gases (NH_3 and CO) and oxidizing gas (NO_2).

Chinese Association of Professionals and Scholars (CAPS) Australia [14], established in Melbourne in 2006, has built an extensive network in both China and Australia. It has been in cooperation with over 50 prestigious universities and academic institutions in China, all universities in Victoria and many across Australia. CAPS Australia has endeavored to provide PhD students and scholars with a multi-functional platform, including: cross-disciplinary communication, assisting members in their career development, and providing online and offline interactions to advance academic collaborations and cultural exchanges between Australia and China.

The CAPS symposium is the flagship event of CAPS Australia for fostering academic exchanges and research innovations across different disciplines among Chinese scholars and professionals. Since 2007, the annual research symposium has invited PhD students and distinguished researchers from local universities and institutes to celebrate the contribution of Chinese academics in Australia. The 12th CAPS Research Symposium, which was held at Deakin's University Melbourne Burwood Campus, co-organized by the Australia Chinese Association for Biomedical Sciences and attended by 400 PhD candidates and research professionals, have been widely reported in both Australia [15] and China [16].

Fig. 1 An overview photo of the 12th CAPS Research Symposium (Photographer: Shanshan).

References

1. Zhang P, Wang H, Hao J, Cui J. Reinforcement of the two-stage leaching of laterite ores using surfactants. *Frontiers of Chemical Science and Engineering*, 2021, 15(3): 562–570
2. Hu G, Wu Y, Chen D, Wang Y, Qi T, Wang L. Selective removal of iron(III) from highly salted chloride acidic solutions by solvent extraction using di(2-ethylhexyl) phosphate. *Frontiers of Chemical Science and Engineering*, 2021, 15(3): 528–537
3. Deng X, Wang L, Xiu Q, Wang Y, Han H, Dai D, Xu Y, Gao H, Liu X. Adsorption performance and physicochemical mechanism of MnO₂-polyethylenimine-tannic acid composites for the removal of Cu(II) and Cr(VI) from aqueous solution. *Frontiers of Chemical Science and Engineering*, 2021, 15(3): 538–551
4. Wang Y, Hu X, Guo T, Hao J, Si C, Guo Q. Efficient CO₂ adsorption and mechanism on nitrogen-doped porous carbons. *Frontiers of Chemical Science and Engineering*, 2021, 15(3): 493–504
5. Zhang Y, Zhou L, Chen L, Guo Y, Guo F, Wu J, Dai B. Synthesis of zeolite Na-P1 from coal fly ash produced by gasification and its application as adsorbent for removal of Cr(VI) from water. *Frontiers of Chemical Science and Engineering*, 2021, 15(3): 518–527
6. Liu J, Wang N. Regularly channeled MXene membranes for ionic and molecular separation. *Frontiers of Chemical Science and Engineering*, 2020
7. Lu H T, Li W, Miandoab E S, Kanehashi S, Hu G. The opportunity of membrane technology for hydrogen purification in the power to hydrogen (P2H) roadmap: a review. *Frontiers of Chemical Science and Engineering*, 2021, 15(3): 464–482
8. Hu S, Liu X. Development of a hydrodynamic model and the corresponding virtual software for dual-loop circulating fluidized beds. *Frontiers of Chemical Science and Engineering*, 2021, 15(3): 579–590
9. Xiao G, Xiao P, Hoadley A, Webley P. Integrated adsorption and absorption process for post-combustion CO₂ capture. *Frontiers of Chemical Science and Engineering*, 2021, 15(3): 483–492
10. Di H, Martin G J O, Dunstan D E. Characterization of particle deposition during crossflow filtration as influenced by permeate flux and crossflow velocity using a microfluidic filtration system. *Frontiers of Chemical Science and Engineering*, 2021, 15(3): 552–561
11. Chen Z, Rizzacasa M A. 2019 highlights of the structural revision of natural product via total synthesis. *Frontiers of Chemical Science and Engineering*, 2021, 15(3): 595–601
12. Hu D, Fu J, Chen S, Li J, Yang Q, Gao J, Tang H, Kan Z, Duan T, Lu S, et al. Block copolymers as efficient cathode interlayer materials for organic solar cells. *Frontiers of Chemical Science and Engineering*, 2021, 15(3): 571–578
13. Jian Y, Qu D, Guo L, Zhu Y, Su C, Feng H, Zhang G, Zhang J, Wu W, Yao M. The prior rules of designing Ti₃C₂T_x MXene-based gas sensor. *Frontiers of Chemical Science and Engineering*, 2021, 15(3): 505–517
14. Chinese Association of Professionals and Scholars (CAPS) Australia. The CAPS website, 2020
15. Deakin University. Deakin celebrates Chinese-Australian partnerships at annual CAPS symposium. The Deakin University website, 2019
16. Xinhua News Agency. The 12th CAPS Research Symposium for Chinese PhDs and Scholars in Australia were held in Melbourne. The Xinhua News Agency website, 2019

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Dr. Guoping Hu is a Research Associate at the University of Western Australia, focusing on R&D work in separation science and engineering. Guoping received his PhD degree from the University of Melbourne in 2018. His research interests are in gas separation and hydrometallurgy, especially using solvent extraction, absorption and adsorption for metal extraction, carbon capture, and CH₄ separation from mixed gases (i.e., the utilization of coal seam gas, landfill gas, biogas and refinery tail gas). His research also extends to biocatalysts, CO₂ utilization, energy policy, hydrogen economics, and clean energy systems. He has contributed to 1 book chapter, 6 industrial reports, 7 patents and more than 20 peer-reviewed journal publications. He was the Secretary (2019–2020) of CAPS, Australia. He won the Young Scientist Research Prize awarded by the Royal Society of Victoria in 2017 and was a finalist of the 2017 IChemE Global Award for Young Researchers.

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