

CURRICULUM VITAE of Professor WU Jishan

- **Name: Professor WU Jishan (吴继善)**
- **Current position and past employment history**

2017.07-	Full Professor	Department of Chemistry, NUS
2014.07-2017.06	Dean's chair Professor	Department of Chemistry, NUS
2012.1-2017.06	Associate Professor	Department of Chemistry, NUS
2010.8-2018.03	Senior Scientist I/II	IMRE, A*STAR (joint appointment)
2007.7-2011.12	Assistant Professor	Department of Chemistry, NUS
2005.10-2007.6	Research Associate	Department of Chemistry and Biochemistry, University of California at Los Angeles, with Sir Fraser Stoddart
2004.5-2005.9	Project Leader	Max-Planck Institute for Polymer Research

- **Academic qualifications**

2004.5	PhD in chemistry	Max-Planck Institute for Polymer Research, with Professor Klaus Müllen
2000.7	Masters in polymer science	Changchun Institute of Applied Chemistry, Chinese Academy of Sciences, with Prof. Xianhong Wang and Prof. Fosong Wang
1997.7	BSc in chemistry	Department of Chemistry, Wuhan University

- **Research interests**

Novel aromatic systems with unique structures and properties; open-shell diradicaloids and polyradicaloids; near infrared dyes for chemical sensing/bio-imaging and solar cells; organic electronics, photonics and spintronics materials and devices; supramolecular chemistry and responsive materials; energy storage materials and devices

- **Major Research Achievements**

Developed a niche research area on open-shell singlet diradicaloids and polyradicaloids; synthesis of soluble and stable near-infrared dyes for solar cell applications; development of fluorescence probes and photoacoustic probes for bio-imaging applications.

- **Awards and Honor**

- (1) NUS Young Investigator Award (**2007**)
- (2) Asian Core Program Lectureship Award from Japan (**2009**)
- (3) Singapore National Young Scientist Award (**2010**)
- (4) Young Chemist Award, Department of Chemistry, NUS (**2011**)
- (5) Young Scientist Award, Faculty of Science, NUS (**2011**)
- (6) NUS Young Researcher Award (**2012**)
- (7) BASF-Singapore National Institute of Chemistry Award in Materials Science (**2012**)
- (8) Invited Lecturer of Asian Excellence from the Japanese Society of Polymer Science (**2012**)

- (9) Asian Core Program Lectureship Award from Hong Kong (2012)
- (10) Distinguished Lectureship Award from the Chemical Society of Japan (2013)
- (11) Outstanding Chemist Award, Department of Chemistry, NUS (2013)
- (12) Dean's Chair Professorship (2014)
- (13) Lead PI of MOE Tier 3 programme (2015)
- (14) Faculty of Science Outstanding Scientist Award (2015)
- (15) Asian Core Program Lectureship Award from Taiwan (2016)
- (16) Asian Core Program Lectureship Award from Thailand (2016)
- (17) Asian Core Program Lectureship Award from Japan (2017)
- (18) Asian Core Program Lectureship Award from Korea (2017)

- **Selected 30 recent publications (as at May 10th, 2018, total ~ 235 articles, citation: 13117, H index: 58, based on Google Scholar)**

- (1) "Macrocyclic Polyradicaloids with Unusual Super-ring Structure and Global Aromaticity", C. Liu, M. E. Sandoval-Salinas, Y. Hong, T. Y. Gopalakrishna, H. Phan, N. Aratani, T. S. Heng, J. Ding, H. Yamada, D. Kim,* D. Casanova*, **J. Wu***, *Chem* 2018, accepted, DOI: 10.1016/j.chempr.2018.03.020 (selected as Cover).
- (2) "Graphene-like Molecules with Four Zigzag Edges", Y. Gu, X. Wu, T. Y. Gopalakrishna, H. Phan, **J. Wu***, *Angew. Chem. Int. Ed.* 2018, 57, DOI: 10.1002/anie.201802818.
- (3) "From Open-shell Singlet Diradicaloid to Closed-shell Global Anti-aromatic Macrocycles", G. Li, T. Y. Gopalakrishna, H. Phan, T. S. Heng, J. Ding, and **J. Wu***, *Angew. Chem. Int. Ed.* 2018, DOI: 10.1002/anie.201803949.
- (4) "Toward π -Conjugated 2D Covalent Organic Radical Frameworks", S. Wu, M. Li, H. Phan, D. Wang, T. S. Heng, J. Ding, Z. Lu, **J. Wu***, *Angew. Chem. Int. Ed.* 2018, 57, accepted.
- (5) "Stable 2D Anti-ferromagnetically Coupled Fluorenyl Radical Dendrons", J. Wang, G. Kim, M. E. Sandoval-Salinas, H. Phan, T. Y. Gopalakrishna, X. F. Lu, D. Casanova*, D. Kim*, **J. Wu***, *Chem. Sci.* 2018, 9, 3395-3400.
- (6) "Rylene Ribbons with Unusual Diradical Character", W. Zeng, H. Phan, T. S. Heng, T. Y. Gopalakrishna, N. Aratani, Z. Zeng, H. Yamada, J. Ding, and **J. Wu***, *Chem.* 2017, 2, 81-92 (selected as the Cover of the January 2017 issue).
- (7) "Fluorenyl Based Macrocyclic Polyradicaloids", X. Lu, S. Lee, Y. Hong, H. Phan, T. Y. Gopalakrishna, T. S. Heng, T. Tanaka, M. E. Sandoval, W. Zeng, J. Ding, D. Casanova, A. Osuka, D. Kim* and **J. Wu***, *J. Am. Chem. Soc.* 2017, 139, 13173-13183 (selected as the Cover of the issue).
- (8) "Toward Stable Superbenzoquinone Diradicaloids", G. Li, H. Phan, T. S. Heng, T. Y. Gopalakrishna, C. Liu, W. Zeng, J. Ding and **J. Wu***, *Angew. Chem. Int. Ed.* 2017, 56, 5012-5016.

- (9) "Conformationally Flexible Bis(9-fluorenylidene)porphyrin Diradicaloids", H. Zhang, H. Phan, T. S. Heng, T. Y. Gopalakrishna, W. Zeng, J. Ding and **J. Wu***, *Angew. Chem. Int. Ed.* **2017**, 56, 13484–13488.
- (10) "Stable Oxindolyl-based Analogues of Chichibabin's and Müller's Hydrocarbons", J. Wang, X. Xu, H. Phan, T. S. Heng, T. Y. Gopalakrishna, G. Li, J. Ding and **J. Wu***, *Angew. Chem. Int. Ed.* **2017**, 56, 14154-14158.
- (11) "Three-dimensionally π -Conjugated Diradical Molecular Cage", X. Gu, T. Y. Gopalakrishna, H. Phan, Y. Ni, T. S. Heng, J. Ding and **J. Wu***, *Angew. Chem. Int. Ed.* **2017**, 56, 15383-15387 (**Highlighted in Synfacts, 2018, 14, 0036**).
- (12) "Tuning Magnetoresistance in Molybdenum Disulphide and Graphene using a Molecular Spin Transition", S. Datta, Y. Cai, I. Yudhistira, Z. Zeng, Y.-W. Zhang, H. Zhang, S. Adam, **J. Wu*** and K. P. Loh*, *Nat. Commun.* **2017**, 8, 677.
- (13) "Efficient singlet fission and triplet-pair emission in a family of zethrene diradicaloids", S. Lukman, J. M. Richter, L. Yang, P. Hu, **J. Wu***, N. C. Greenham*, and A. J. Musser*, *J. Am. Chem. Soc.* **2017**, 139, 18376-18385.
- (14) "Stable 3,6-Linked Fluorenyl Radical Oligomers with Intramolecular Anti-ferromagnetic Coupling and Polyradical Characters", X. Lu, S. Lee, J. O. Kim, T. Y. Gopalakrishna, H. Phan, T. S. Heng, Z. L. Lim, Z. Zeng, J. Ding, D. Kim* and **J. Wu***, *J. Am. Chem. Soc.* **2016**, 138, 13049-13058.
- (15) "Higher Order π -Conjugated Polycyclic Hydrocarbons with Open-Shell Singlet Ground State: Nonazethrene versus Nonacene", R. Huang, H. Phan, T. S. Heng, P. Hu, W. Zeng, S. Dong, S. Das, Y. Shen, J. Ding, D. Casanova* and **J. Wu***, *J. Am. Chem. Soc.* **2016**, 138, 10323-10330.
- (16) "Fully Fused Quinoidal/Aromatic Carbazole Macrocycles with Polyradical Characters", S. Das, T. S. Heng, J. L. Zafra, P. M. Burrezo, M. Kitano, M. Ishida, T. Y. Gopalakrishna, P. Hu, A. Osuka, J. Casado*, J. Ding*, D. Casanova* and **J. Wu***, *J. Am. Chem. Soc.* **2016**, 138, 7782-7790 (**selected as JACS Spotlights, see J. Am. Chem. Soc. 2016, 138, 7446-7447**).
- (17) "Super-heptazethrene", W. Zeng, Z. Sun, T. S. Heng, T. P. Goncalves, T. Y. Gopalakrishna, K.-W. Huang, J. Ding and **J. Wu***, *Angew. Chem. Int. Ed.* **2016**, 55, 8816-8819 (selected as **Very Important Paper; "Highlight" in Angew. Chem. Int. Ed. 2016, 55, 9830-9832**).
- (18) "Towards Tetraradicaloid: The Effect of Fusion Mode on Radical Character and Chemical Reactivity", P. Hu, S. Lee, T. S. Heng, N. Aratani, T. P. Goncalves, Q. Qi, X. Shi, H. Yamada, K.-W. Huang, J. Ding, D. Kim* and **J. Wu***, *J. Am. Chem. Soc.* **2016**, 138, 1065-1077.
- (19) "Diradical Approach towards BODIPY Based Near-infrared Dyes with Intense Absorption around $\lambda=1100\text{ nm}$ ", Y. Ni, S. Lee, M. Son, N. Aratani, M. Ishida, H. Yamada, Y.-T. Chang, H. Furuta, D. Kim* and **J. Wu***, *Angew. Chem. Int. Ed.* **2016**, 55, 2815-2819.

- (20) "Pro-aromatic and Anti-aromatic π -Conjugated molecules: An Irresistible Wish to Be Diradicals", Z. Zeng, X. Shi, C. Chi, a J. T. López Navarrete, J. Casado* and **J. Wu***, **Chem. Soc. Rev.** **2015**, *44*, 6578-6596.
- (21) "Push–Pull Type Oligo(*N*-annulated perylene)quinodimethanes: Chain Length and Solvent-Dependent Ground States and Physical Properties", Z. Zeng, S. Lee, M. Son, K. Fukuda, P. M. Burrezo, X. Zhu, Q. Qi, R.-W. Li, J. T. López Navarrete, J. Ding,* J. Casado,* M. Nakano,* D. Kim* and **J. Wu***, **J. Am. Chem. Soc.** **2015**, *137*, 8572-8583.
- (22) "Extended Zethrenes, *p*-Quinodimethanes and Periacenes with a Biradical Ground State", Z. Sun, Z. Zeng and **J. Wu***, "**Acc. Chem. Res.** **2014**, *47*, 2582-2591.
- (23) "*N*-Annulated Perylene as An Efficient Electron Donor for Porphyrin-based Dyes: Enhanced Light-harvesting Ability and High-efficiency Co(II/III)-based Dye-sensitized Solar Cells", J. Luo, M. Xu, R. Li, K. Huang, C. Jiang, Q. Qi, W. Zeng, J. Zhang, C. Chi, P. Wang* and **J. Wu***, **J. Am. Chem. Soc.** **2014**, *136*, 265-272.
- (24) "Dibenzoheptazethrene Isomers with Different Biradical Characters: An Exercise of Clar's Aromatic Sextet Rule in Singlet Biradicaloids", Z. Sun, S. Lee, K. Park, X. Zhu, W. Zhang, B. Zheng, P. Hu, Z. Zeng, S. Das, Y. Li, C. Chi, R. Li, K. Huang*, J. Ding*, D. Kim* and **J. Wu***, **J. Am. Chem. Soc.** **2013**, *135*, 18229-18236 (**Highlighted in Synfacts, 2014, 10, 0146**).
- (25) "Tetracyano- Quaterrylene and Hexarylenequinodimethanes with Tunable Ground States and Strong Near-infrared Absorption", Z. Zeng, S. Lee, J. Zafra, M. Ishida, Z. Zhu, Z. Sun, Y. Ni, R. Webster, R. Li, J. López Navarrete, C. Chi*, J. Ding*, J. Casado*, D. Kim* and **J. Wu***, **Angew. Chem. Int. Ed.** **2013**, *52*, 8561-8565.
- (26) "Pushing Extended *p*-Quinodimethanes to The Limit: Stable Tetracyano- Oligo(*N*-annulated perylene)quinodimethanes with Tunable Ground States", Z. Zeng, M. Ishida, J. Zafra, X. Zhu, Y. Sung, N. Bao, R. Webster, B. Lee, R. Li, W. Zeng, Y. Li, C. Chi, J. López Navarrete, J. Ding*, J. Casado*, D. Kim* and **J. Wu***, **J. Am. Chem. Soc.** **2013**, *135*, 6363-6371 (**featured in JACS Spotlights, see J. Am. Chem. Soc. 2013, 135, 7081**).
- (27) "Low band gap polycyclic hydrocarbons: from closed-shell near infrared dyes and semiconductors to open-shell radicals", Z. Sun, Q. Ye, C. Chi* and **J. Wu***, **Chem. Soc. Rev.** **2012**, *41*, 7857.
- (28) "Tetrabenzo- Chichibabin's Hydrocarbons: Tunable Ground State and Unusual Conversion between Their Closed-shell and Open-shell Resonance Forms", Z. Zeng, S. M. Yung, N. Bao, D. Tan, R. Lee, J. L. Zefra, B. S. Lee, M. Ishida, J. Ding, K.-W. Huang*, R. D. Webster*, J. Casado*, D. Kim* and **J. Wu***, **J. Am. Chem. Soc.** **2012**, *134*, 14513-14525 (**featured in JACS Spotlights, see J. Am. Chem. Soc. 2012, 134, 15605-15606**).
- (29) "Kinetically Blocked Heptazethrene and Octazethrene: Closed-shell or Open-shell in The Ground State?", Y. Li, W.-K. Heng, B.-S. Lee, N. Aratani, J.-L. Zafra, N. Bao, R. Lee, Y.-M.

Sung, Z. Sun, K.-W. Huang, R. D. Webster, J. T. Lopez Navarrete, J. Casado*, D.-H. Kim*, J. Ding*, A. Osuka* and **J. Wu***, *J. Am. Chem. Soc.* **2012**, *134*, 14913-14922.

(30) "Soluble and Stable Heptazethrene Bis(dicarboximide) with a Singlet Open-shell Ground State", Z. Sun, K. Huang* and **J. Wu***, *J. Am. Chem. Soc.* **2011**, *133*, 11896-11899 (*selected as ACS Noteworthy Chemistry and highlighted in Synfacts, 2011, 11, 1179*).

- **External research grants** (since 2007, > **10 million S\$** total project values)
 - (1) NUS start-up grant (AcRF Tier 1 FRC), "Synthesis and applications of supramolecular block copolymers", 2007-2009, PI;
 - (2) NUS-Technion joint project, "From self-assembled monolayers to fully operational devices – pattern and print of field effect transistors", 2008-2009, PI;
 - (3) NUS Young Investigator Award, "Nano-sized graphene, graphyne and graphdiyne as potential materials for electronics", 2008-2011, PI;
 - (4) Singapore national research foundation competitive research program (NRF CRP), "Graphene-related materials and devices", 2008-2014, co-PI;
 - (5) A*Star SERC TSRP, "Graphene-based composites and thin-films for electrical applications", 2009-2012, PI;
 - (6) DSTA DIRP, "Soluble and stable laser absorbing dyes", 2009-2011, PI;
 - (7) A*Star BMRC-NMRC joint program, "Stable near infrared dye based fluorescent probe-library for biolabelling, biosensing and bioimaging", 2011-2014, PI;
 - (8) MOE Tier 2, "Porphyrin-based NIR dyes for high-efficient solar cells", 2012-2015, PI;
 - (9) MOE Tier 2, "Stable pi-radicals as new charge and spin transporting materials", 2014-2017, PI;
 - (10) MOE Tier 3 programme, "Open-shell polycyclic hydrocarbons for electronics, photonics and spintronics", 2015-2020, lead PI
- **Education:** 20+ PhD students and 15+ postdocs (since 2007)
- **Conferences:** > 60 invited talks in the local and international conferences
- **Service:** Advisory board member of *ACS Omega*; chair of the 10th Singapore International Chemistry Conference (SICC-10); chair of departmental search committee; member of the Faculty Promotion and Tenure Committee (FPTC); committee member of Singapore Material Research Society (MRS-S)