Curriculum Vitae of Guo-Xin Jin

Guo-Xin Jin was born in Nanjing, China in April 1959. In 1978 he entered Nanjing University (China) majoring in Chemistry. He obtained his B.Sc. and Master degree in Organic Chemistry in 1982 and 1984 separately and then his Ph.D. in Inorganic Chemistry in 1987 from Nanjing University. In 1988 he was awarded Alexander von Humboldt Fellowship and went to Germany, and began his academic carrier as a post-doctor at Inorganic Chemistry Institute, Bayreuth University with Prof. Dr. Max Herberhold. In 1995 he returned to China and worked in the Changchun Institute of Applied Chemistry, Chinese Academy of Sciences as professor and then as the head of a Laboratory, and started the research of chalcogenide chemistry of organometallic transition metals and catalysts for olefin polymerization. He moved to Chemistry Department, Fudan University, Shanghai in 2001 as Chair Professor (CheungKong Scholarship), and head of Inorganic Chemistry Institute. His current research interests include various aspects of organometallic chemistry and catalysts for olefin polymerization. He has published more than 350 research papers and 20 review papers and books, and has been involved in 45 patents. He is Members of the Editorial Advisory Board for Dalton Transactions (2004 to now), Coordination Chemistry Reviews (2016 to now), Organometallics (2007 to 2009), Journal of Organometallic Chemistry (2004 to now), Chinese Journal of Inorganic Chemistry (2001 to now) and Chinese Journal of Organic Chemistry (2002 to now). He was as an Associate Editor of Dalton Transactions since 2006-2019. He obtained the name of "Special Award for Scientists", Government of China in 2001. He was awarded "First Prize of Shanghai Natural Science Award" in 2009, "Zhuang Chang Gong Prize", Chinese Chemical Society in 2013 and "Excellent Young Scientist Award" of National Science Foundation of China in 1999. He was selected as foreign member of Russian Academy of Natural Sciences in 2014 and obtained Humboldt Research Award in 2016.

Education:

1984-1987	PhD.	Coordination Chemistry Institute, Nanjing University
1981-1984	M.S.	Chemistry Department, Nanjing University
1978-1981	B.S.	Chemistry Department, Nanjing University

Professional Career:

2001- present	Chair Professor and Head of Inorganic Chemistry Institute, Fudan University, Shanghai
1996-2001	Professor and Head of Laboratory, Changchun Institute of Applied Chemistry, Chinese Academy of Sciences, Changchun.
1999, 8-12	Guest Professor, Material Science Center, Nagoya University, Japan.
1990-1995	Research Assistant at Inorganic Chemistry Institute, Bayreuth University, Germany.
1988-1990	Post-doctoral Fellow (Alexander von Humboldt Fellow), Bayreuth University, Germany.

Main scientific achievements: Prof. Guo-Xin Jin has carried out continuous research more than 30 years focusing on the synthesis, structure, bonding rules and applications of organometallic complexes. Over the past decades, he has devoted the majority of his research to the synthetic methodology and application development of organometallic compounds, including (a) systematic studies of metal-metal bond-forming reactions and synthetic methods; (b) strategies for the construction of functional multinuclear organometallic systems and exploration of applications based on such coordination self-assemblies; (c) organometallic catalysts for olefin polymerization.

(a). Establishing a general synthesis method for organometallic compounds with metal-metal bonds

Jin developed a class of 16-electron organometallic carborane complexes Cp*M[$E_2C_2(B_{10}H_{10})$] (M = Ir, Rh and Co, E = S, Se, Te) which can be used as model precursors. He found that the electron-deficient nature of the central "pseudo-aromatic" metal-containing five-membered ring and the strong coordination ability of

chalcogen elements allow these complexes to undergo intermolecular redox reactions with various low-valent transition metal complexes to form polynuclear metal complexes containing metal-metal bonds. His contribution on metal-metal bond formation in transition metal complexes not only provides a new kind of model compounds for studying the specific roles and mechanisms of metal clusters in various catalytic reactions, but also paves the way to design and synthesis the novel conductive molecular wires. Also, the fundamental rules derived from these results provided beneficial references for further systematic studies on the preparation of new metal-metal-bond-containing clusters (Angew. Chem. Int. Ed., 2005, *44*, 259-262; Chem. Euro. J., 2005, *11*, 7343-7351; Chem. Soc. Rev., 2007, *36*,1543 - 1560).

Moreover, He has developed a selective metal-induced B-H bond activation route based upon these findings. He explored the metal-mediated B-H functionalization of carborane derivatives and established the synthetic approach based on redox reactions between pseudo-aromatic half-sandwich oraganometallic carborane precursors and low-valent transition metal reagents. By exploiting regioselective metal-induced B-H activation, Prof. Jin has developed a facile and efficient route to carborane-based supramolecular metallacycles (J. Am. Chem. Soc., 2014, 136, 2825-2832; Chem. Euro. J., 2018, *24*, 10357-10363; Coord. Chem. Rev., 2017, *350*, 300–319).

(b). Jin has established a highly efficient synthetic route to functional multinuclear organometallic architectures with wide adaptability, and developed a controlled method for the synthesis of template-free Borromean ring and interlock structures.

The design, synthesis, and properties of functional organometallic polynuclear systems is one of the most attractive topics of chemical research. As the active intermediates of many transition metal catalytic reaction systems, it is of great significance to prepare and isolate the relevant compounds.

Jin developed a universal approach for the synthesis of functional soluble multinuclear organometallic systems. Based on years of his research on organometallic chemistry, he strategically introduced the organometallic fragments Cp*M (Cp* = η^5-C_5Me_5, M = Ir, Rh) as building blocks to effectively solved the general problem of poor solubility of many large multinuclear systems. On this basis, a series of new organometallic multinuclear systems with exquisite structures and specific functions were rationally designed and successfully prepared. Based on the synthetic rules derived from such results, Prof. Jin developed and refined a highly efficient and controllable synthetic route to functional multinuclear organometallic architectures. He also explored the selective adsorption of small molecules and synergistic catalytic reactions using these architectures.

By extending the spacers used to construct the rectangular structures, Jin designed a kind of larger molecular “splints”, allowing construction of 3D structures in the self-assembly process, and found that these complexes could undergo reversible single-crystal-to-single-crystal (SCSC) structural transformations upon reversible adsorption and desorption of small molecules in crystalline state, providing a kind of model complexes for the selective adsorption of small molecules (Angew. Chem. Int. Ed., 2009, 48, 6234-6238; Accounts Chem. Res., 2014, *47*, 3571-3579).

In order to study the regularity of multi-component self-organization processes, Jin studied the process of self-sorting heterometallic assemblies with multiple components, and he proposed a design and synthesis strategy for heterometallic assemblies, namely the “chelation-directed self-sorting” strategy. Moreover, Jin extended the strategy by the utilization of different transition metals as the second site, such as copper, nickel, and zinc, as a result, a series of functional heterometallic coordination cages were successfully constructed. By his careful investigation, interesting metal-anchoring host-guest behaviour was observed and an in-cage size-selective catalytic procedure was confirmed. Jin’s work highlights the potential of this type of organometallic assemblies in enzyme-mimicking catalysis (J. Am. Chem. Soc., 2014, 136, 2982-2985; J. Am.

Chem. Soc., 2014, *136*, 15521−15524; Chem. Soc. Rev. 2009, *38*, 3419–3434).

Furthermore, Jin firstly reported the selective synthesis of Borromean ring structures by coordination-driven self-assembly without any template, which has been regarded as one of the most challenging topics in synthetic chemistry. He found that utilization of a couple of linker fragments with proper ratio will led to a series of template-free Cp*Rh-based Borromean rings. He also demonstrated that these structures showed remarkable catalytic abilities with high efficiency and wide substrate selectivity in the acyl transfer reaction with appropriate cavity sizes and the inclusion of catalytically-active copper centres, (J. Am. Chem. Soc., 2013, *135*, 8125−8128). His systematic research in this area provides a rationale for the preparation of complex topology systems by coordination self-assembly approach (Angew. Chem. Int. Ed., 2014, *53*, 11218-11222; CHEM. 2017, *3*, 110-121; Accounts Chem. Res., 2018, *51*, 2148−2158).

(a) Development of the polymeric and self-immobilized catalysts for olefin polymerization

He developed a series late transition metal (iron and nickel) and metallocene polymerization catalysts and, most remarkably, he introduced the concept of the polymeric polymerization catalysts. These novel and highly efficient catalysts were obtained from metallocenes or other late transition metal complexes containing one alkenyl group tethered to one ligand which was subsequently used to copolymerize the metal complex with ethylene. The polymeric polymerization catalysts exbibited excellent properties with high activity, well morphanogy of polymer products, controllable moecular weight of polymer products and no foulling in the polymerization process (Coordin. Chem. Rev., 2006, 250, 95-109; Chines Petant: ZL2006 1 0026454.1; ZL 2007 1 0040016.5; ZL 2007 1 0040021.6).

In addition, Jin has designed a series of half-sandwich Ir and Rh complexes with hemilabile N-heterocyclic carbine ligands and found that they can be used as effective catalysts for olefin polymerization. The Ir and Rh N-functionalized carbene complexes showed high activity as pre-catalysts for the polymerization of ethylene and norbornene, which is the first report of this kind of metal-carbene complexes exhibiting high activity toward the vinyl addition polymerization of norbornene and the polymerization of ethylene. These metal-carbene complexes obtained by Jin led to the development of a class of highly efficient catalysts for olefin polymerization, which significantly expanded the applications of carbene complexes (Organometallics, 2004, 23, 6002-6007; Chem. Euro. J., 2011, *17*, 8576 – 8583 Chem. Comm., 2008, 3178-3180).

Recent Representative Publications

1. Li-Long Dang, Zhen-Bo Sun, Wei-Long Shan, Yue-Jian Lin, Zhen-Hua Li, Guo-Xin Jin*
Coordination-driven self-assembly of a molecular figure-eight knot and other topologically complex architectures
Nature Commun., **2019**, *10*, 2057 (**DOI: 10.1038/s41467-019-10075-6**).

2. Wen-Xi Gao, Hai-Ning Zhang, and Guo-Xin Jin*
Supramolecular catalysis based on discrete heterometallic coordination-driven metallacycles and metallacages
Coordination Chemistry Reviews, **2019**, *386*, 69–84

3. Wen-Xi Gao, Hui-Jun Feng, Yue-Jian Lin, and Guo-Xin Jin*
Covalent Post-assembly Modification Triggers Structural Transformations of Borromean rings
J. Am. Chem. Soc., **2019**, *141*, 9160−9164.

4. Peng-Fei Cui, Yang Gao, Shu-Ting Guo, Yue-Jian Lin, Zhen-Hua Li, Guo-Xin Jin*
Metalloradicals Stabilized by a Carborane Backbone
Angewandte Chemie-International Edition, **2019**, **2019**, *58*, 8129 –8133.

5. Wei-Long Shan, Yue-Jian Lin, F. Ekkehardt Hahn* and Guo-Xin Jin*
Highly Selective Synthesis of Iridium(III) Metalla[2]catenanes Through Component Pre-Orientation by π···π Stacking
Angewandte Chemie-International Edition, **2019**, *58*, 5882-5886 and selected as inside Cover.

6. Yang Gao, Shu-Ting Guo, Peng-Fei Cui, Francisco Aznarez and Guo-Xin Jin*
Iridium-Induced Regioselective B-H and C-H Activations at Azo-Substituted *m*-Carboranes: Facile Access to Polynuclear Complexes
ChemComm, **2019**, *55*, 210 – 213**.**

7. Ye Lu, Hai-Ning Zhang, and Guo-Xin Jin*
Molecular Borromean Rings based on Half-Sandwich Organometallic Architectures
Accounts of Chemical Research, **2018***, 51,* 2148−2158.

8. Ye Lu, Yu-Xin Deng, Yue-Jian Lin, Ying-Feng Han, Zhen-Hua Li, Guo-Xin Jin*
Molecular Borromean Rings based on Dihalogenated Ligands
Chem, **2017**, *3,* 110-121 (Highlight by Prof. Stoddart).

9. Long Zhang, Lin Lin, Dong Liu, Yue-Jian Lin, Zhen-Hua Li, and Guo-Xin Jin*
Stacking-interaction-induced selective conformation of discrete aromatic arrays and Borromean rings
Journal of the American Chemical Society, **2017**, *139,* 1653-1660.

10. Wen-Ying Zhang, Yue-Jian Lin, Ying-Feng Han* and Guo-Xin Jin*
Facile Separation of Regioisomeric Compounds by a Heteronuclear Organometallic Capsule
Journal of the American Chemical Society, **2016***, 138,* 10700-10707

11. Long Zhang, Yue-Jian Lin, Zhen-Hua Li, Guo-Xin Jin*
Rational design of polynuclear organometallic assemblies from a simple hetero-multifunctional ligand
Journal of the American Chemical Society, **2015**, *137*, 13670-13678.

12. Ying-Ying Zhang, Xu-Yu Shen, Lin-Hong Weng, Guo-Xin Jin*
Octadecanuclear Macrocycles and Nonanuclear Bowl-shaped Structures based on two Analogous Pyridyl-substituted Imidazole-4,5-dicarboxylic acid
Journal of the American Chemical Society, **2014**, *136*, 15521-15524.

13. Sheng-Li Huang, Yue-Jian Lin, Zhen-Hua Li and Guo-Xin Jin*
Self-assembly of Molecular Borromean Rings
Angewandte Chemie-International Edition, **2014**, *53*, 11218-11222.

14. Zi-Jian Yao, Wei-Bin Yu, Yue-Jian Lin, Sheng-Li Huang, and Guo-Xin Jin*
Iridium-Mediated Regioselective B-H/C-H Activation of Carborane Cage: A Facile Synthetic Route to Metallacycles with a Carborane Backbone
Journal of the American Chemical Society, **2014**, *136*, 2825-2832.

15. Hao Li, Ying-Feng Han, Guo-Xin Jin*
Stepwise Construction of Discrete Heterometallic Coordination Cages Based on Self-Sorting Strategy
Journal of the American Chemical Society, **2014**, *136*, 2982-2985.

16. Ying-Feng Han, Guo-Xin Jin*;
Half-sandwich Iridium- and Rhodium-based Organometallic Architectures: Rational Design, Synthesis, Characterization, and Applications
Accounts of Chemical Research, **2014**, *47*, 3571-3579

17. Sheng-Li Huang, Yue-Jian Lin, T. S. Andy Hor, Guo-Xin Jin*
Cp*Rh-Based Heterometallic Metallarectangles: Size-Dependent Borromean Link Structures and

Catalytic Acyl Transfer
Journal of the American Chemical Society, **2013**, *135*, 8125−8128.

18. Ping Hu, Jian-Qiang Wang, Fosong Wang and Guo-Xin Jin*
Preparation, Structure, and Ethylene (Co-) Polymerization Behavior of Group IV Metal Complexes with [OSSO] Carborane Ligand
Chem. Euro. J., (Selected as Cover-Art), **2011**, *17*, 8576 – 8583.

19. Ying-Feng Han, Wei-Guo Jia,Wei-Bin Yu and Guo-Xin Jin*
Stepwise Formation of Organometallic Macrocycles, Prisms and Boxes from Half-Sandwich Ir, Rh and Ru-based Bimetallic Edges
Chem. Soc. Rev., **2009**, *38*, 3419–3434.

20. Ying-Feng Han, Wei-Guo Jia, Yue-Jian Lin, and Guo-Xin Jin*
Extending Rectangular Metalorganic Frames to the Third Dimension: Discrete Organometallic Boxes for Reversible Trapping of Halocarbons Occuring with Conservation of the Lattice
Angewandte Chemie-International Edition, **2009**, *48*, 6234-6238.