

# CURRICULUM VITAE

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## **EDUCATION:**

*Ph.D.* (1990) Condensed Matter Physics, Arizona State University, Tempe, USA

*B.Sc.* (1982) Metal Physics, University of Science & Technology Beijing, Beijing, China

## **POSITIONS HELD AND RESPONSIBILITIES:**

- 2011- Professor of Physics, Department of Physics, Arizona State University
- 2011- Senior Scholar, The Global Institute of Sustainability, Arizona State University
- 2012- Director, Professional Science Master's in Nanoscience Program, Arizona State University
- 2014- Chair, Steering Committee of the John M. Cowley Center for HREM, Arizona State University
- 2006-11 Professor, Department of Physics & Astronomy, University of Missouri-St. Louis
- 2006-11 Professor, Department of Chemistry & Biochemistry, University of Missouri-St. Louis
- 2006-11 Director, Center for Nanoscience, University of Missouri-St. Louis
- 2004-06 Senior Science Fellow and Senior Research Manager, Monsanto Company, St. Louis
- 2000-04 Science Fellow and Group Leader, Monsanto Company, St. Louis
- 1994-00 Research Specialist and Group Leader, Monsanto Company, St. Louis
- 1992-94 Research Scientist, Center for Solid State Science, Arizona State University
- 1990-92 Postdoctoral Research Associate, Center for Solid State Science, Arizona State University

## **MAJOR AWARDS, HONORS & PROFESSIONAL SERVICES:**

- 2012 Elected Fellow of the Microscopy Society of America
- 2005 "Above and Beyond Award" for "significant technical breakthrough in developing and commercializing a Monsanto proprietary non-noble metal nanocatalyst". Monsanto Company
- 2003 Appointed as Senior Science Fellow of Monsanto Company for "extremely productive research contributions, superior scientific expertise and strategic leadership in broad technical areas, sustained high level of performance, and significant economic impact on Monsanto businesses". Monsanto Company
- 2002 Inducted to the Monsanto's Hall of Fame of Science and Technology for "significant contribution to development of industrial catalysts". Monsanto Company
- 2002 Prestigious Monsanto Edgar M. Queeny Award for advancing the science of industrial catalysis, significantly reducing the cost of manufacturing Monsanto products, and having had substantial economic impact on Monsanto; Citation: "discovery, development and commercialization of Monsanto's proprietary bimetallic bifunctional catalyst technology for the production of glyphosate". The Edgar M. Queeny Award is the highest award that can be bestowed to an outstanding scientist of Monsanto
- 2001 "Above and Beyond Award" for "extraordinary performance and significant breakthrough contributions to developing Monsanto Catalyst Technologies"
- 2000 Appointed as Science Fellow of Monsanto Corporate Research for "sustained record of significant technical achievements of value to Monsanto, superior strategic technical leadership, and significant influence across Monsanto business units"

- 2000 Outstanding Performance Award for significant contribution to achieving key Monsanto business goals, Office of Science & Technology, Monsanto Company
- 1999 Monsanto Excellence Award for discovering, developing, and commercializing a proprietary industrial catalyst that significantly reduces the amount of waste products in manufacturing Monsanto products, Monsanto Company
- 1999 Outstanding Performance Award for discovering and developing an industrially important catalyst for manufacturing Monsanto products, Monsanto Company
- 1998 Second Prize in Physical Sciences, 57<sup>th</sup> Annual Meeting of the Microscopy Society of America, for outstanding contribution to the development of high-resolution secondary electron microscopy
- 1997 “Reach Award”, Monsanto Corporate Research; citation: “in recognition of outstanding contributions in developing novel SEM imaging technology and applying it in glyphosate research studies”
- 1996 “Reach Award”, Monsanto Corporate Research; citation: “in recognition of outstanding contributions to the successful commercial scale-up of the Monsanto new DEA/DSIDA catalyst”
- 1994 Young Scientist Award, *13th International Congress for Electron Microscopy*, Paris, France, for developing high-resolution surface spectroscopy and microscopy techniques
- 1993 Scholarship Award, *International Union of Crystallography*
- 1990 Presidential Award, *12th International Congress for Electron Microscopy*, Seattle, USA, for contribution to the development of atomic resolution high-angle annular dark-field electron microscopy and application of this technique to the study of quantum-well structures
- 1987 Dean's List of Outstanding Scholars, Arizona State University
- 1986 Dean's List of Outstanding Scholars, Arizona State University

**REFEREE FOR:**

Science; Nature; Nature Chemistry; Journal of the American Chemical Society; Nano Letters; ACS Nano; ACS Catalysis; ChemCatChem; Applied Physics Letter; J. Applied Physics; J. Catalysis; Catalysis Letter; J. Electron Microscopy; Microscopy and Microanalysis; Surface Science; Ultramicroscopy; J. Nanomaterials; J. Nanotechnology; NSF Grant Proposals & Panels; DOE basic energy sciences proposals; Petroleum Research Fund; Lenard Wood Institute Research Fund; Foundation for Research, Science and Technology of New Zealand, etc.

**MEMBERSHIP IN SCIENTIFIC SOCIETIES:**

American Chemical Society	Microscopy Society of America
American Physical Society	Materials Research Society
North American Catalysis Society	

**RESEARCH INTERESTS:**

Energy conversion and storage; clusters, nanoparticles, and nanostructured catalysts; surface structure, surface chemical reactions, and heterogeneous catalysis; nanophase metal oxides, electrochromic displays, biosensors, and smart devices; conducting polymers, fibers, and nanocomposites; electrocatalysts and fuel cells; metal oxide nanostructures and solar cells; porous materials and batteries/supercapacitors; theory and application of advanced electron spectroscopy, diffraction, and imaging techniques; nanoscience, nanotechnology and nanobiotechnology.

**LIST OF PATENTS AND DISCLOSURES**

- 1 Deeply reduced oxidation catalyst and its use in preparing N-(phosphonomethyl) glycine compounds. USP 7,067,693, June 27, 2006
- 2 Deeply reduced oxidation catalyst and its use for catalyzing liquid phase oxidation reactions. USP 6,603,039, August 5, 2003

- 3 Deeply reduced oxidation catalyst and its use for catalyzing liquid phase oxidation reactions. USP 6,417,133, July 9, 2002
- 4 Oxidation catalyst and its use for catalyzing liquid phase oxidation reactions. WO 2006031938 A3, Jun 8, 2006
- 5 Oxidation catalyst and its use for catalyzing liquid phase oxidation reactions. US 20100130774 A1, May 27, 2010
- 6 Deeply reduced oxidation catalyst and its use for catalyzing liquid phase oxidation reactions. CA 2610653 C, May 29, 2012

## LIST OF PUBLICATIONS

### Book Chapters

- 8 “Widening the Impact: Informal, Introductory, and Industry Nanochallenges”, P. Fraundorf and Jingyue Liu, Book Chapter in *Nanoscale Science and Engineering Education*, edited by Aldrin E. Sweeney and Sudipta Seal. (Publisher: American Scientific Publishers, 2008).
- 7 “Advanced Electron Microscopy in Developing Nanostructured Heterogeneous Catalysts”, Jingyue Liu, Book Chapter in *Nanotechnology in Catalysis*, edited by B Zhou, S. Hermans and G. A. Somorjai. (Publisher: Kluwer Academic/Plenum Publishers, 2005).
- 6 “High Resolution Scanning Electron Microscopy”, Jingyue Liu, Book Chapter in *Microscopy for Nanotechnology*, edited by N Yao and Z. L. Wang. (Publisher: Kluwer Academic/Plenum Publishers, 2005).
- 5 “Nanophase metal oxide materials for electrochromic displays”, Jingyue Liu and J. P. Coleman, book chapter in: *Handbook of Nanophase and Nanostructured Materials: Synthesis / Characterization / Materials Systems and Applications I / Materials Systems and Applications II*, edited by Zhong Lin Wang, Yi Liu, and Ze Zhang (Publisher: Kluwer Academic/Plenum Publishers, 2003).
- 4 “Scanning transmission electron microscopy of nanoparticles”, Jingyue Liu, book chapter in “*Characterization of Nanophase Materials*”, edited by Z. L. Wang (Wiley-VCH, Weinheim, 1999).
- 3 “Scanning electron and Auger microscopy of surfaces and small particles”, J. A. Venables and Jingyue Liu, chapter in: “*Encyclopedia of Surface and Colloid Science*”, edited by Arthur T. Hubbard (Publisher: Marcel Dekker, Inc., New York, 2002)
- 2 “Atomic-scale characterization of metal-support interactions in supported metal catalysts”, K. Sun, J. Liu, N. K. Nag, and N. D. Browning, book chapter in: *Recent Developments in Materials Science*, (Publisher: Research Signpost, 2003)
- 1 “Atomic scale studies of heterogeneous catalysts”, R. F. Klie, K. Sun, M. M. Disko, J. Liu, and N. D. Browning, book chapter in: Dekker *Encyclopedia of Nanoscience and Nanotechnology*, (Publisher: Marcel Dekker, 2004)

### Publications in Refereed Journals and Proceedings

#### 2017

- 294 Aberration-corrected scanning transmission electron microscopy in single-atom catalysis: Probing the catalytically active centers (perspective), Jingyue (Jimmy) Liu, *Chinese Journal of Catalysis* **38**, xxx-xxx (2017) (accepted)
- 293 Probing the catalytic behavior of ZnO nanowire supported Pd<sub>1</sub> single-atom catalyst for selected reactions, Jia Xu, Yian Song, Honglu Wu, Jingyue Liu, *Chinese Journal of Catalysis* **38**, xxx-xxx (2017) (accepted)
- 292 Remarkable effect of alkalis on the chemoselective hydrogenation of functionalized nitroarenes over high-loading Pt/FeO<sub>x</sub> catalysts, Haisheng Wei, Yujing Ren, Aiqin Wang, Xiaoyan Liu, Xin Liu, Leilei Zhang, Shu Miao, Lin Li, Jingyue Liu, Junhu Wang, Guofu Wang, Dangsheng Su, Tao Zhang, *Chem. Sci.* **8**, 5126-5131 (2017)

- 291 CO oxidation on metal oxide supported single Pt atoms: The role of the support, Yang Lou, Jingyue Liu, *Ind. Eng. Chem. Res.* **56**, 6916–6925 (2017)
- 290 More active Ir subnanometer clusters than single-atoms for catalytic oxidation of CO at low temperature, Jian Lin, Yang Chen, Yanliang Zhou, Lin Li, Botao Qiao, Aiqin Wang, Jingyue Liu, Xiaodong Wang, Tao Zhang, *AIChE Journal* **63**, 4003–4012 (2017)
- 289 Stable and solubilized active Au atom clusters or selective epoxidation of cis-cyclooctene with molecular oxygen, Linping Qian, Zhen Wang, Evgeny V. Beletskiy, Jingyue Liu, Haroldo J. dos Santos, Tiehu Li, Maria do C. Rangel, Mayfair C. Kung, Harold H. Kung, *Nat. Commun.* **8**, #14881 (2017)
- 288 A highly active Pt–Fe/ $\gamma$ -Al<sub>2</sub>O<sub>3</sub> catalyst for preferential oxidation of CO in excess of H<sub>2</sub> with a wide operation temperature window, *Chem. Commun.* **53**, 9020-9023 (2017)
- 287 Toward the design of a hierarchical perovskite support: Ultra-sintering-resistant gold nanocatalysts for CO oxidation, Chengcheng Tian, Xiang Zhu, Carter W. Abney, Xiaofei Liu, Guo Shiou Foo, Zili Wu, Meijun Li, Harry M. Meyer, Suree Brown, Shannon M. Mahurin, Sujuan Wu, Shi-Ze Yang, Jingyue Liu, Sheng Dai, *ACS Catal.* **7**, 3388–3393 (2017)
- 286 Observing the overgrowth of a second metal on silver cubic seeds in solution by surface-enhanced Raman scattering oxidation, Yun Zhang, Jingyue Liu, Jaewan Ahn, Ting-Hui Xiao, Zhi-Yuan Li, and Dong Qin, *ACS Nano* **11**, 5080–5086 (2017)
- 285 High-indexed Pt<sub>3</sub>Ni alloy tetrahedral nanoframes evolved through preferential CO etching, Chenyu Wang, Lihua Zhang, Hongzhou Yang, Jinfong Pan, Jingyue Liu, Charles Dotse, Yiliang Luan, Rui Gao, Cuikun Lin, Jun Zhang, James P. Kilcrease, Xiaodong Wen, Shouzhong Zou, and Jiye Fang, *Nano Lett.* **17**, 2204–2210 (2017)
- 284 Catalysis by supported single metal atoms, J Liu\*, *ACS Catalysis* **7**, 34-59 (2017)
- 283 Pt<sub>1</sub>/CeO<sub>2</sub>-ZnO nanowire single-atom catalysts for water-gas shift reaction, Jia Xu, Yian Song, Jingyue Liu, *Microscopy and Microanalysis* **23**(S1), 1856-1857 (2017)
- 282 The stability of high metal-loading Pt<sub>1</sub>/Fe<sub>2</sub>O<sub>3</sub> single-atom catalyst under different gas environment, Jingyue Liu, Sibin Duan, Rongming Wang, *Microscopy and Microanalysis* **23**(S1), 1898-1899 (2017)
- 281 STEM-EELS evaluation of the dependence of localized surface plasmon linewidth on the size of Au nanoparticles, Jiake Wei, Jia Xu, Xuedong Bai, Jingyue Liu, *Microscopy and Microanalysis* **23**(S1), 1554-1555 (2017)
- 280 Facet selective growth of iridium chains/wires of single-atom width on the {1010} surfaces of ZnO nanowires, Jia Xu, Yian Song, Honglu Wu, Jingyue Liu, *Microscopy and Microanalysis* **23**(S1), 484-485 (2017)
- 279 Development of two-dimensional polycrystalline Co<sub>3</sub>O<sub>4</sub> hierarchical structures and Pt<sub>1</sub>/2D-Co<sub>3</sub>O<sub>4</sub> single-atom catalysts, Jingyue Liu, Yafeng Cai, Yun Guo, *Microscopy and Microanalysis* **23**(S1), 1868-1869 (2017)
- 2016**
- 278 Atomic scale observation of oxygen delivery during silver-oxygen nanoparticle catalyzed oxidation of carbon nanotubes, Y Yue, D Yuchi, P Guan, J Xu, L Guo, J Liu\*, *Nature Communications* **7**, #12251 (2016)
- 277 Radially aligned porous carbon nanotube arrays on carbon fibers: A hierarchical 3D carbon nanostructure for high-performance capacitive energy storage, G Zhang, Y Song, H Zhang, J Xu, H Duan, J Liu\*, *Advanced Functional Materials* **26**, 3012-3020 (2016)
- 276 Facet-selective epitaxial growth of  $\delta$ -Bi<sub>2</sub>O<sub>3</sub> on ZnO nanowires, Jia Xu and Jingyue Liu\*, *Chemistry of Materials* **28**, 8141-8148 (2016)
- 275 Strong metal–support interactions between gold nanoparticles and nonoxides, H Tang, J Wei, F Liu, B Qiao, X Pan, L Li, J Liu, J Wang, T Zhang, *Journal of American Chemical Society* **138**, 56-59 (2016)

- 274 Pt-based icosahedral nanocages: using a combination of {111} facets, twin defects, and ultrathin walls to greatly enhance their activity toward oxygen reduction, X Wang, L Figueroa-Cosme, X Yang, M Luo, J Liu, Z Xie, Y Xia, *Nano letters* **16**, 1467-1471 (2016)
- 273 Catalytically active Rh sub-nanoclusters on TiO<sub>2</sub> for CO oxidation at cryogenic temperatures, Hongling Guan, Jian Lin, Botao Qiao, Xiaofeng Yang, Lin Li, Shu Miao, Jingyue Liu, Aiqin Wang, Xiaodong Wang, Tao Zhang, *Angewandte Chemie International Edition* **55**, 2820-2824 (2016)
- 272 Ultrastable hydroxyapatite/titanium-dioxide-supported gold nanocatalyst with strong metal-support interaction for carbon monoxide oxidation, Hailian Tang, Fei Liu, Jiak Wei, Botao Qiao, Kunfeng Zhao, Yang Su, Changzi Jin, Lin Li, Jingyue (Jimmy) Liu, Junhu Wang, Tao Zhang, *Angewandte Chemie International Edition* **55**, 10606-10611 (2016)
- 271 Coating Pt-Ni octahedra with ultrathin Pt shells to enhance the durability without compromising the high activity toward oxygen reduction, J. Park, J. Liu, H.-C. Peng, S. Maio, S.-I. Choi, S. Bao, X. Yang, Y. Xia, *ChemSusChem* **9**, 2209-2215 (2016)
- 270 Gold-based cubic nanoboxes with well-defined openings at the corners and ultrathin walls less than two nanometers thick, X Sun, J Kim, KD Gilroy, J Liu, TAF König, D Qin, *ACS Nano* **10**, 8019-8025 (2016)
- 269 Core-shell nanostructured Au@Ni Pt<sub>2</sub> electrocatalysts with enhanced activity and durability for oxygen reduction reaction, LL Shen, GR Zhang, S Miao, J Liu, BQ Xu, *ACS Catalysis* **6**, 1680-1690 (2016)
- 268 Synthesis of Ag/PANI@ MnO<sub>2</sub> core-shell nanowires and their capacitance behavior, C Pan, Y Lv, H Gong, Q Jiang, S Miao, J Liu\*, *RSC Advances* **6**, 17415-17422 (2016)
- 267 Single atom gold catalysts for low-temperature CO oxidation, B Qiao, JX Liang, A Wang, J Liu\*, T Zhang, *Chinese Journal of Catalysis* **37**, 1580-1586 (2016)
- 266 Synthesis of anchored bimetallic catalysts via epitaxy, J Liu, B Qiao, Y Song, Y Huang, JJ Liu\*, *Catalysts* **6**, 88 (2016)
- 265 Highly active and sintering-resistant heteroepitaxy of Au nanoparticles on ZnO nanowires for CO oxidation, J Liu, B Qiao, Y Song, H Tang, Y Huang, JJ Liu\*, *Journal of Energy Chemistry* **25**, 361-370 (2016)
- 264 Catalysis by Supported Single Metal Atoms, Jingyue Liu\*, Sibin Duan, Jia Xu, Botao Qiao, Yang Lou, *Microscopy and Microanalysis* **22**(S3), 860-861 (2016)
- 263 Imaging at the single-atom level in closed-cell in situ gas reactions, Lawrence F. Allard, Sibin Duan, Jingyue (Jimmy) Liu, *Microscopy and Microanalysis* **22**(S3), 876-877 (2016)
- 262 ZnO nanowire supported metal single atoms for CO oxidation, Jia Xu, Honglu Wu, Jingyue (Jimmy) Liu\*, *Microscopy and Microanalysis* **22**(S3), 872-873 (2016)

## 2015

- 261 Platinum-based nanocages with subnanometer-thick walls and well-defined, controllable facets, Lei Zhang, Luke T. Roling, Xue Wang, Madeline Vara, Miaofang Chi, Jingyue Liu, Sang-Il Choi, Jinho Park, Jeffrey A. Herron, Zhaoxiong Xie, Manos Mavrikakis, and Younan Xia. *Science* **349**, 412-416 (2015)
- 260 Palladium-platinum core-shell icosahedra with substantially enhanced activity and durability towards oxygen reduction, Xue Wang, Sang-Il Choi, Luke T. Roling, Ming Luo, Cheng Ma, Lei Zhang, Miaofang Chi, Jingyue Liu, Zhaoxiong Xie, Jeffrey A. Herron, Manos Mavrikakis, Younan Xia, *Nature Communications* **6**, # 7594 (2015)
- 259 Catalysis on singly dispersed bimetallic sites, Shiran Zhang, Luan Nguyen, Jin-Xia Liang, Junjun Shan, Jingyue Liu, Anatoly I. Frenkel, Anitha Patlolla, Weixin Huang, Jun Li, Franklin Tao, *Nature Communications* **6**, # 7938 (2015)
- 258 Ultrastable single-atom gold catalysts with strong covalent metal-support interaction (CMSI), Botao Qiao, Jin-Xia Liang, Aiqin Wang, Cong-Qiao Xu, Jun Li, Tao Zhang, Jingyue (Jimmy) Liu\*, *Nano Research* **8**, 2913-2924 (2015)
- 257 Use of reduction rate as a quantitative knob for controlling the twin structure and shape of palladium nanocrystals, Yi Wang, Hsin-Chieh Peng, Jingyue Liu, Cheng Zhi Huang, Younan Xia,

- Nano Letters* **15**, 1445-1450 (2015)
- 256 Strong coupling between ZnO excitons and localized surface plasmons of silver nanoparticles studied by STEM-EELS, Jiake Wei, Nan Jiang, Jia Xu, Xuedong Bai, and Jingyue Liu\*, *Nano Letters* **15**, 5926-5931 (2015)
- 255 Bifunctional Ag@Pd-Ag nanocubes for highly sensitive monitoring of catalytic reactions by surface-enhanced Raman spectroscopy, Jumei Li, Jingyue Liu, Yin Yang, and Dong Qin, *Journal of the American Chemical Society* **137**, 7039-7042 (2015)
- 254 Pd@Pt core-shell concave decahedra: A class of catalysts for the oxygen reduction reaction with enhanced activity and durability, Xue Wang, Madeline Vara, Ming Luo, Hongwen Huang, Aleksey Ruditskiy, Jinho Park, Shixiong Bao, Jingyue Liu, Jane Howe, Miaofang Chi, Zhaoxiong Xie, Younan Xia, *Journal of the American Chemical Society* **137**, 15036-15042 (2015)
- 253 Ultrastable 3V-PPH3 polymers supported single Rh sites for fixed-bed hydroformylation of olefins, Miao Jiang, Li Yan, Yunjie Ding, Qi Sun, Jia Liu, Hejun Zhu, Ronghe Lin, Fengshou Xiao, Zheng Jiang, Jingyue Liu, *Journal of Molecular Catalysis A: Chemical* **404/405**, 211-217 (2015)
- 252 The shape effect of TiO<sub>2</sub> in VO<sub>x</sub>/TiO<sub>2</sub> catalysts for selective reduction of NO by NH<sub>3</sub>, Quanquan Shi, Yong Li, Yan Zhou, Shu Miao, Na Ta, Ensheng Zhan, Jingyue (Jimmy) Liu, Wenjie Shen, *J. Mater. Chem. A* **3**, 14409-14415 (2015)
- 251 Highly active Au<sub>1</sub>/Co<sub>3</sub>O<sub>4</sub> single-atom catalyst for CO oxidation at room temperature, Botao Qiao, Jian Lin, Aiqin Wang, Yang Chen, Tao Zhang, Jingyue Liu\*, *Chinese Journal of Catalysis* **36**, 1505-1511 (2015)
- 250 Five-fold twinned Pd nanorods and their use as templates for the synthesis of bimetallic or hollow nanostructures, H. Huang, L. Zhang, T. Lv, A. Ruditskiy, J. Liu, Z. Ye, Y. Xia, *ChemNanoMat* **1**, 246-252 (2015)
- 249 Self-assembly of atomically thin and unusual face-centered cubic Re nanowires within carbon nanotubes, Fan Zhang, Pengju Ren, Xiulian Pan, Jingyue Liu, Mingrun Li, and Xinhe Bao, *Chemistry of Materials* **27**, 1569-1573 (2015)
- 248 Hetero-epitaxially anchoring Au nanoparticles onto ZnO nanowires for CO oxidation, Jiabin Liu, Botao Qiao, Yian Song, Yudong Huang, Jingyue (Jimmy) Liu\*, *Chem. Communications* **51**, 15332-15335 (2015)
- 247 Little do more: a highly effective Pt<sub>1</sub>/FeO<sub>x</sub> single-atom catalyst for the reduction of NO by H<sub>2</sub>, Jian Lin, Botao Qiao, Ning Li, Lin Li, Xiucheng Sun, Jingyue Liu, Xiaodong Wang, Tao Zhang, *Chem. Commun.* **51**, 7911-7914 (2015)
- 246 Photochemical deposition of highly dispersed Pt nanoparticles on porous CeO<sub>2</sub> nanofibers for the water-gas shift reaction, Ping Lu, Botao Qiao, Ning Lu, Dong Choon Hyun, Jinguo Wang, Moon J. Kim, Jingyue Liu, Younan Xia, *Advanced Functional Materials* **25**, 4153-4162 (2015)
- 245 Facile synthesis of Ag nanorods with no plasmon resonance peak in the visible region by using Pd decahedra of 16 nm in size as seeds, Ming Luo, Hongwen Huang, Sang-Il Choi, Chao Zhang, Robson Rosa da Silva, Hsin-Chieh Peng, Zhi-Yuan Li, Jingyue Liu, Zhike He, Younan Xia, *ACS Nano* **9**, 10523-10532 (2015)
- 244 Co-N-C catalyst for C-C coupling reactions: On the catalytic performance and active sites, Leilei Zhang, Aiqin Wang, Wentao Wang, Yanqiang Huang, Xiaoyan Liu, Shu Miao, Jingyue Liu, Tao Zhang, *ACS Catalysis* **5**, 6563-6572 (2015)
- 243 Highly efficient catalysis of preferential oxidation of CO in H<sub>2</sub>-rich stream by gold single-atom catalysts, Botao Qiao, Jiabin Liu, Yang-Gang Wang, Qingquan Lin, Xiaoyan Liu, Aiqin Wang, Jun Li, Tao Zhang, and Jingyue (Jimmy) Liu\*, *ACS Catalysis* **5**, 6249-6254 (2015)
- 242 Strong coupling between ZnO exciton and localized surface plasmon in Ag nanoparticles studied by STEM-EELS, Jiake Wei, Jia Xu, Xuedong Bai, Jingyue Liu\*, *Microscopy and Microanalysis* **21** (S3), 1685-1686 (2015)
- 241 In situ observation of Ag nanoparticle catalyzed oxidation of carbon nanotubes in an aberration-corrected environmental TEM, Yonghai Yue, Datong Yuchi, Jia Xu, Lin Guo and Jingyue Liu\*, *Microscopy and Microanalysis* **21** (S3), 423-424 (2015)

- 240 Template synthesis of hollow carbon nanofibers, Yian Song, Jiake Wei, and Jingyue Liu\*, *Microscopy and Microanalysis* **21** (S3), 989-990 (2015)
- 239 Aberration-corrected STEM of highly loaded Pt<sub>1</sub>/NiO single-atom catalysts: Structural and catalytic stability, S. B. Duan, R. M. Wang and J. Y. Liu\*, *Microscopy and Microanalysis* **21** (S3), 1729-1730 (2015)
- 238 Aberration-corrected STEM study of atomically dispersed Pt<sub>1</sub>/FeO<sub>x</sub> catalyst with high loading of Pt, Botao Qiao, Aiqin Wang, Tao Zhang and Jingyue Liu\*, *Microscopy and Microanalysis* **21** (S3), 1733-1734 (2015)
- 237 Aberration-corrected STEM of four-atom rhenium nanowires confined within carbon nanotubes, Fan Zhang, Pengju Ren, Xiulian Pan, Xinhe Bao and Jingyue Liu\*, *Microscopy and Microanalysis* **21** (S3), 1733-1734 (2015)
- 236 Aberration-corrected STEM of cross-sectional view of core-shell nanowires prepared by ultramicrotomy, J. Xu and J. Y. Liu\*, *Microscopy and Microanalysis* **21** (S3), 1739-1740 (2015)
- 2014**
- 235 FeO<sub>x</sub>-supported platinum single-atom and pseudo-single-atom catalysts for chemoselective hydrogenation of functionalized nitroarenes, Haisheng Wei, Xiaoyan Liu, Aiqin Wang, Leilei Zhang, Botao Qiao, Xiaofeng Yang, Yanqiang Huang, Shu Miao, Jingyue Liu\*, Tao Zhang, *Nature Communications* **5**, #5634 (2014)
- 234 Galvanic replacement-free deposition of Au on Ag for core-shell nanocubes with enhanced chemical stability and SERS activity, Yin Yang, Jingyue Liu, Zheng-Wen Fu, Dong Qin, *J. Am. Chem. Soc.* **136**, 8153–8156 (2014)
- 233 Single-atom catalysis in mesoporous photovoltaics: The principle of utility maximization, Yantao Shi, Chunyu Zhao, Haisheng Wei, Jiahao Guo, Suxia Liang, Aiqin Wang, Tao Zhang, Jingyue Liu and Tingli Ma, *Adv. Mater.* **26**, 8147–8153 (2014)
- 232 Polyol syntheses of palladium decahedra and icosahedra as pure samples by maneuvering the reaction kinetics with additives, H. Huang, Y. Wang, A. Ruditskiy, H.C. Peng, X. Zhao, L. Zhang, J. Liu, Z. Ye, Y. Xia, *ACS Nano* **8**, 7041–7050 (2014)
- 231 Supported single Pt<sub>1</sub>/Au<sub>1</sub> atoms for methanol steam reforming, Xiang-Kui Gu, Botao Qiao, Chuan-Qi Huang, Wu-Chen Ding, Keju Sun, Ensheng Zhan, Tao Zhang, Jingyue Liu\*, Wei-Xue Li, *ACS Catal.* **4**, 3886–3890 (2014)
- 230 Ferric oxide-supported Pt subnano clusters for preferential oxidation of CO in H<sub>2</sub>-rich gas at room temperature, Botao Qiao, Aiqin Wang, Lin Li, Qingquan Lin, Haisheng Wei, Jingyue Liu\*, Tao Zhang, *ACS Catal.* **4**, 2113–2117 (2014)
- 229 Highly active small palladium clusters supported on ferric hydroxide for carbon monoxide-tolerant hydrogen oxidation, B. Qiao, J. Lin, L. Li, A. Wang, J. Liu\*, T. Zhang, *ChemCatChem* **6**, 547–554 (2014)
- 228 Theoretical and experimental investigations on single-atom catalysis: Ir<sub>1</sub>/FeO<sub>x</sub> for CO oxidation, J.X. Liang, J. Lin, X.F. Yang, A.Q. Wang, B.T. Qiao, J. Liu, T. Zhang, J. Li. *J. Phys. Chem. C* **118**, 21945–21951 (2014)
- 227 H<sub>2</sub>AuCl<sub>4</sub>: A dual agent for studying the chloride-assisted vertical growth of citrate-free Ag nanoplates with Au serving as a marker, Jiawei Zhang, Jingyue Liu, Zhao-Xiong Xie, Dong Qin, *Langmuir* **30**, 15520–15530 (2014)
- 226 The versatile imaging capabilities of aberration-corrected STEM, J Liu\*, *Microscopy and Microanalysis* **20** (S3), 88-89 (2014)
- 225 ZnO nanowire-supported Ag catalyst for methanol steam reforming, J. X. Liu, J. Xu, Y. D. Huang and J. Y. Liu\*, *Microscopy and Microanalysis* **20** (S3), 508-509 (2014)
- 224 Anchoring Au nanoparticles onto ZnO nanowires by heteroepitaxy, J. X. Liu, Y. D. Huang and J. Y. Liu\*, *Microscopy and Microanalysis* **20** (S3), 1986-1987 (2014)
- 223 Interfacial atomic structure of BiO<sub>x</sub> functionalized ZnO nanowires, J. Xu and J. Y. Liu\*, *Microscopy and Microanalysis* **20** (S3), 1964-1965 (2014)

- 222 Atomic resolution study of the bonding between ZnO nanowires, J. Xu and J. Y. Liu\*, *Microscopy and Microanalysis* **20** (S3), 194-195 (2014)
- 221 In situ investigation of the carbothermal reduction of ZnO nanowires, Jingyue (Jimmy) Liu\* and Lawrence F. Allard, *Microscopy and Microanalysis* **20** (S3), 1554-1555 (2014)

### 2013

- 220 Single-atom catalysts: A new frontier in heterogeneous catalysis, X Yang, A Wang, B Qiao, J Li, J Liu\*, T Zhang, *Account Chemical Research* **46**, 1740–1748 (2013)
- 219 Remarkable performance of Ir<sub>1</sub>/FeO<sub>x</sub> single-atom catalyst in water gas shift reaction, J Lin, A Wang, B Qiao, X Liu, X Yang, X Wang, J Liang, L Li, J Liu\*, T. Zhang, *Journal of the American Chemical Society* **135**, 15314–15317 (2013)
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