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APPOINTMENTS

Cain Department of Chemical Engineering, **Louisiana State University**, Baton Rouge, LA
Assistant Professor 2016 – present

EDUCATION

Northwestern University, Evanston, IL 2013 − 2016
Postdoctoral Researcher
Advisor: Peter C. Stair

University of California, Santa Barbara, CA 2009 − 2012
Postdoctoral Researcher
Advisors: Galen D. Stucky and Horia Metiu

Institute of Chemistry, Chinese Academy of Sciences, Beijing, China 2004 − 2009
Ph.D. in Chemistry; "*Ionic Liquid Assisted Synthesis of Functional Nanomaterials*"
Advisors: Buxing Han and Zhimin Liu

Zhengzhou University, Zhengzhou, China 2000 − 2004
B.E. in Materials Science and Engineering
Advisor: Qun Xu

FELLOWSHIPS AND AWARDS

Outstanding Ph.D. Dissertation Award (top 5%) 2009
Institute of Chemistry, Chinese Academy of Sciences

Director Fellowship 2007
Institute of Chemistry, Chinese Academy of Sciences

Qingdao Haiyang Chemical Co. Ltd. Fellowship 2007
Institute of Chemistry, Chinese Academy of Sciences

Outstanding B.E. Dissertation Award (top 5%) 2004
Zhengzhou University

RESEARCH EXPERIENCE

Northwestern University 2013 − 2016
Postdoctoral Researcher
Advisor: Peter C. Stair

Site-specific atomic layer deposition (ALD) of noble metals on mesoporous zeolites

- Investigated mesoporous zeolites as supports for the site-specific ALD of noble metals.
- Identified and quantified platinum single atoms and nanoparticles via diffuse reflectance infrared Fourier transform spectroscopy (DRIFTS) using CO as a probe molecule.
- Identified that Pt nanoparticles, not single atoms, are the active sites in low-temperature CO oxidation and water-gas shift reactions via CO/O_2 and CO/H_2O DRIFTS.

- Supervised a group of more than ten ALD users, arranged user meetings, coordinated the instrument usage, trained new users, and maintained the instrument; installed a new ALD instrument for the group.

Olefin metathesis on supported metal oxides

- Increased the low-temperature propylene metathesis activity of MoO_x/SiO_2 and WO_x/SiO_2 by two to three orders of magnitude using a highly efficient and straightforward activation procedure.
- Clarified the deactivation mechanism of MoO_x/SiO_2 and WO_x/SiO_2 in propylene metathesis.
- Developed a new methodology to regenerate heterogeneous olefin metathesis catalysts.
- Identified the olefin metathesis active sites of MoO_x/SiO_2, monomeric $Mo(=O)_2$ dioxos, using isotope tracing, infrared and Raman spectroscopy, and atomic-resolution electron microscopy.
- Designed and assembled a multifunctional fixed-bed reactor with online GC and MS analysis.
- Wrote NSF grants.

University of California, Santa Barbara 2009 − 2012
Postdoctoral Researcher
Advisors: Galen D. Stucky and Horia Metiu

Hierarchical porous zeolite synthesis

- Proposed and validated a new concept for hierarchical porous zeolite synthesis, without using any supramolecular or hard template.
- Initiated international collaboration with Professor Avelino Corma (ITQ, Spain).

Microwave synthesis of metal chalcogenides in ionic liquids

- Developed a green, universal, and scalable approach for the synthesis of metal chalcogenide micro/nanostructures from elemental precursors.

Halogen mediated natural gas conversions

- Discovered the iodine catalytic effect on methane bromination.
- Demonstrated bromine-iodine mediated propane oxidative dehydrogenation, and achieved a single-pass propylene yield of 80% at a reaction temperature of 800K.
- Investigated the catalytic performances of supported group VIII metals in dibromomethane hydrodebromination, in order to improve the efficiency of bromine-based methane conversions.
- Unveiled the analogous nature of the halogen and oxygen-mediated pathways for the conversion of methane to higher hydrocarbons.
- Calculated the reaction thermodynamics and simulated the reaction kinetics.

Institute of Chemistry, Chinese Academy of Sciences 2004 − 2009
Graduate student researcher
Advisors: Buxing Han and Zhimin Liu

Ionic liquid assisted synthesis of functional nanomaterials

- Investigated phase, shape and size-controlled synthesis of TiO_2 nanocrystals in ionic liquids.
- Developed microwave-assisted ionothermal syntheses of high quality TiO_2 and SnO_2 nanocrystals.
- Synthesized polystyrene-polyaniline and CNT-SiO_2 core-shell structures via nucleation control.

PUBLICATIONS

(44) Ding, K.L.; Gulec, A.; Johnson, A.M.; Drake, T.L.; Wu, W.Q.; Lin, Y.Y.; Weitz, E.; Marks, L.D.; Stair, P.C. "Highly efficient activation, regeneration, and active site identification of oxide-based olefin metathesis catalysts." ***ACS Catal.*** **2016, 6, 5740-5746.**

(43) Wu, W.Q.; Drake, T.L.; Ding, K.L.; Stair, P.C.; Weitz, E. "Methanol Oxidation to Formate over ALD Prepared VO_x/θ-Al_2O_3 Catalysts: a Mechanistic Study." *Submitted.*

(42) Ding, K.L.; Gulec, A.; Johnson, A.M.; Schweitzer, N.M.; Stucky, G.D.; Marks, L.D.; Stair, P.C. "Identification of active sites in CO oxidation and water-gas shift over supported Pt catalysts." ***Science*** **2015, 350, 189-192.**

(41) Ding, K.L.; Corma, A.; Maciá-Agulló, J.A.; Hu, J.G.; Krämer, S.; Stair, P.C.; Stucky, G.D. "Constructing Hierarchical Porous Zeolites via Kinetic Regulation." *J. Am. Chem. Soc.* 2015, 137, 11238-11241.

(40) Lin, Y.Y.; Wu, Z.L.; Wen J.G.; Ding, K.L.; Yang, X.Y.; Poeppelmeier, K.R.; Marks, L.D. "Adhesion and Atomic Structures of Gold on Ceria Nanostructures: The Role of Surface Structure and Oxidation State of Ceria Supports." ***Nano Lett.*** 2015, 15, 5375-5381.

(39) Ding, K.L.; Lu, H.; Zhang, Y.C.; Sneaker, M.L.; Liu, D.Y.; Maciá-Agulló, J.A.; Stucky, G.D. "Microwave Synthesis of Microstructured and Nanostructured Metal Chalcogenides from Elemental Precursors in Phosphonium Ionic Liquids." *J. Am. Chem. Soc.* 2014, 136, 15465-15468.

(38) Ding, K.L.; Metiu, H.; Stucky, G.D. "The Selective High-Yield Conversion of Methane Using Iodine-Catalyzed Methane Bromination." *ACS Catal.* 2013, 3, 474-477.

(37) Ding, K.L.; Metiu, H.; Stucky, G.D. "Interplay Between Bromine and Iodine in Oxidative Dehydrogenation." *ChemCatChem* 2013, 5, 1906-1910.

(36) Ding, K.L.; Zhang, A.H.; Stucky, G.D. "Iodine Catalyzed Propane Oxidative Dehydrogenation Using Dibromomethane as an Oxidant." *ACS Catal.* 2012, 2, 1049-1056.

(35) Ding, K.L.; Derk, A.R.; Zhang, A.H.; Hu, Z.P.; Stoimenov, P.; Stucky, G.D.; Metiu, H.; McFarland, E.W. "Hydrodebromination and Oligomerization of Dibromomethane." *ACS Catal.* 2012, 2, 479-486.

(34) Zhang, F.; Shi, Q.H.; Zhang, Y.C.; Shi, Y.F.; Ding, K.L.; Zhao, D.Y.; Stucky, G.D. "Fluorescence Upconversion Microbarcodes for Multiplexed Biological Detection: Nucleic Acid Encoding." ***Adv. Mater.*** 2011, 23, 3775.

(33) Zhang, F.; Haushalter, R.C.; Haushalter, R.W.; Shi, Y.F.; Zhang, Y.C.; Ding, K.L.; Zhao, D.Y.; Stucky, G.D. "Rare-Earth Upconverting Nanobarcodes for Multiplexed Biological Detection." ***Small*** 2011, 7, 1972-1976.

(32) Zhang, Y.C.; Wang, H.; Kraemer, S.; Shi, Y.F.; Zhang, F.; Snedaker, M.; Ding, K.L.; Moskovits, M.; Snyder, G.J.; Stucky, G.D. "Surfactant-Free Synthesis of Bi_2Te_3-Te Micro-Nano Heterostructure with Enhanced Thermoelectric Figure of Merit." ***ACS Nano*** 2011, 5, 3158-3165.

(31) An, G.M.; Sun, Z.Y.; Zhang, Y.; Ding, K.L.; Xie Y.; Tao, R.T.; Zhang, H.Y.; Liu, Z.M. "CO_2-Mediated Synthesis of ZnO Nanorods and Their Application in Sensing Ethanol Vapor." ***J. Nanosci. Nanotechno.*** 2011, 11, 1252-1258.

(30) Tao, R.T.; Xie, Y.; An, G.M.; Ding, K.L.; Zhang, H.Y.; Sun, Z.Y.; Liu, Z.M. "Arginine-mediated synthesis of highly efficient catalysts for transfer hydrogenations of ketones." ***J. Colloid Interf. Sci.*** 2010, 351, 501-506.

(29) Xie, Y.; Ding, K.L.; Liu, Z.M.; Li, J.J.; An, G.M.; Tao, R.T.; Sun, Z.Y.; Yang, Z.Z. "The Immobilization of Glycidyl-Group-Containing Ionic Liquids and Its Application in CO_2 Cycloaddition Reactions." ***Chem. Eur. J.*** 2010, 16, 6687-6692.

(28) Zhou, X.S.; Wu, T.B.; Ding, K.L.; Hu, B.J.; Hou, M.Q.; Han, B.X. "Dispersion of graphene sheets in ionic liquid [bmim][PF_6] stabilized by an ionic liquid polymer." ***Chem. Commun.*** 2010, 46, 386-388.

(27) Hu, B.J.; Wu, T.B.; Ding, K.L.; Zhou, X.S.; Jiang, T.; Han, B.X. "Seeding Growth of Pd/Au Bimetallic Nanoparticles on Highly Cross-Linked Polymer Microspheres with Ionic Liquid and Solvent-Free Hydrogenation." ***J. Phys. Chem. C*** 2010, 114, 3396-3400.

(26) Hu, B.J.; Ding, K.L.; Wu, T.B.; Zhou, X.S.; Fan, H.L.; Jiang, T.; Wang, Q.; Han, B.X. "Shape controlled synthesis of palladium nanocrystals by combination of oleylamine and alkylammonium alkylcarbamate and their catalytic activity." ***Chem. Commun.*** 2010, 46, 8552-8554.

(25) Ding, K.L.; Miao, Z.J.; Hu, B.J.; An, G.M.; Sun, Z.Y.; Han, B.X.; Liu, Z.M. "Study on the Anatase to Rutile Phase Transformation and Controlled Synthesis of Rutile Nanocrystals with the Assistance of Ionic Liquid." *Langmuir* 2010, 26, 10294-10302.

(24) Ding, K.L.; Miao, Z.J.; Hu, B.J.; An, G.M.; Sun, Z.Y.; Han, B.X.; Liu, Z.M. "Shape and Size Controlled Synthesis of Anatase Nanocrystals with the Assistance of Ionic Liquid." *Langmuir* 2010, 26, 5129-5134.

(23) Feng, J.; An, G.M.; Chen, B.H.; Li, Y.X.; Ding, K.L.; Xie, Y.; Liu, Z.M. "Post-Synthesis of Ti-SBA-15 in Supercritical CO_2-Ethanol Solution." ***Clean-Soil Air Water*** 2009, 37, 527-533.

(22) Zhang, H.Y.; Xie, Y.; Liu, Z.M.; Tao, R.T.; Sun, Z.Y.; Ding, K.L.; An, G.M. "p-Aminophenylacetic acid-mediated synthesis of monodispersed titanium oxide hybrid microspheres in ethanol solution." ***J. Colloid Interf. Sci.*** 2009, 338, 468-473.

(21) Tao, R.T.; Miao, S.D.; Liu, Z.M.; Xie, Y.; Han, B.X.; An, G.M.; Ding, K.L. "Pd nanoparticles immobilized on sepiolite by ionic liquids: efficient catalysts for hydrogenation of alkenes and Heck reactions." ***Green Chem.*** 2009, 11, 96-101.

(20) Miao, S.D.; Liu, Z.M.; Miao, Z.J.; Han, B.X.; Ding, K.L.; An, G.M.; Xie, Y. "Ionic liquid-mediated synthesis of crystalline CeO_2 mesoporous films and their application in aerobic oxidation of benzyl alcohol." ***Micro. Meso. Mater.*** 2009, 117, 386-390.

(19) Xie, Y.; Ding, K.L.; Liu, Z.M.; Tao, R.T.; Sun, Z.Y.; Zhang, H.Y.; An, G.M. "The In Situ Controllable Loading of Ultrafine Noble Metal Particles on Titania." ***J. Am. Chem. Soc.*** 2009, 131, 6648-6649.

(18) Zhou, X.S.; Wu, T.B.; Ding, K.L.; Hu, B.J.; Hou, M.Q.; Han, B.X. "The dispersion of carbon nanotubes in water with the aid of very small amounts of ionic liquid." ***Chem. Commun.*** 2009, 1897-1899.

(17) Ding, K.L.; Hu, B.J.; Xie, Y.; An, G.M.; Tao, R.T.; Zhang, H.Y.; Liu, Z.M. "A simple route to coat mesoporous SiO_2 layer on carbon nanotubes." *J. Mater. Chem.* 2009, 19, 3725-3731.

(16) An, G.M.; Yu, P.; Xiao, M.J.; Liu, Z.M.; Miao, Z.J.; Ding, K.L.; Mao, L.Q. "Low-temperature synthesis of Mn_3O_4 nanoparticles loaded on multi-walled carbon nanotubes and their application in electrochemical capacitors." ***Nanotechnology*** 2008, 19, 275709.

(15) Xie, Y.; Zhang, C.L.; Miao, S.D.; Liu, Z.M.; Ding, K.L.; Miao, Z.J.; An, G.M.; Yang, Z.Z. "One-pot synthesis of ZnS/polymer composites in supercritical CO_2-ethanol solution and their applications in degradation of dyes." ***J. Colloid Interf. Sci.*** 2008, 318, 110-115.

(14) Ma, X.M.; Jiang, T.; Han, B.X.; Zhang, J.C.; Miao, S.D.; Ding, K.L.; An, G.M.; Xie, Y.; Zhou, Y.X.; Zhu, A.L. "Palladium nanoparticles in polyethylene glycols: Efficient and recyclable catalyst system for hydrogenation of olefins." ***Catal. Commun.*** 2008, 9, 70-74.

(13) Miao, Z.J.; Ding, K.L.; Wu, T.B.; Liu, Z.M.; Han, B.X.; An, G.M. Miao, S.D.; Yang, G.Y. "Fabrication of 3D-networks of native starch and their application to produce porous inorganic oxide networks through a supercritical route." ***Micro. Meso. Mater.*** 2008, 111, 104-109.

(12) Ding, K.L.; Miao, Z.J.; Liu, Z.M.; An, G.M.; Xie, Y.; Tao, R.T.; Han, B.X. "Imidazolium cation mediated synthesis of polystyrene-polyaniline core-shell structures." *J. Mater. Chem.* 2008, 18, 5406-5411.

(11) Miao, S.D.; Liu, Z.M.; Zhang, Z.F.; Han, B.X.; Miao, Z.J.; Ding, K.L.; An, G.M. "Ionic liquid-assisted immobilization of Rh on attapulgite and its application in cyclohexene hydrogenation." ***J. Phys. Chem. C*** 2007, 111, 2185-2190.

(10) An, G.M.; Na, N.; Zhang, X.R.; Miao, Z.J.; Miao, S.D.; Ding, K.L.; Liu, Z.M. "SnO_2/carbon nanotube nanocomposites synthesized in supercritical fluids: highly efficient materials for use as a chemical sensor and as the anode of a lithium-ion battery." ***Nanotechnology*** 2007, 18, 435707.

(9) An, G.M.; Ma, W.H.; Sun, Z.Y.; Liu, Z.M.; Han, B.X.; Miao, S.D.; Miao, Z.J.; Ding, K.L. "Preparation of titania/carbon nanotube composites using supercritical ethanol and their photocatalytic activity for phenol degradation under visible light irradiation." ***Carbon*** 2007, 45, 1795-1801.

(8) An, G.M.; Yu, P.; Mao, L.Q.; Sun, Z.Y.; Liu, Z.M.; Miao, S.D.; Miao, Z.J.; Ding, K.L. "Synthesis of PtRu/carbon nanotube composites in supercritical fluid and their application as an electrocatalyst for direct methanol fuel cells." ***Carbon*** 2007, 45, 536-542.

(7) Miao, Z.J.; Wu, Y.Y.; Zhang, X.R.; Liu, Z.M.; Han, B.X.; Ding, K.L.; An, G.M. "Large-scale production of self-assembled SnO_2 nanospheres and their application in high-performance chemiluminescence sensors for hydrogen sulfide gas." ***J. Mater. Chem.*** 2007, 17, 1791-1796.

(6) Miao, Z.J.; Liu, Z.M.; Ding, K.L.; Han, B.X.; Miao, S.D.; An, G.M. "Controlled fabrication of rare earth fluoride superstructures via a simple template-free route." ***Nanotechnology*** 2007, 18, 125605.

(5) He, J.L.; Wu, T.B.; Zhang, Z.F.; Ding, K.L.; Han, B.X.; Xie, Y.; Jiang, T.; Liu, Z.M. "Cycloaddition of CO_2 to epoxides catalyzed by polyaniline salts." ***Chem. Eur. J.*** 2007, 13, 6992-6997.

(4) Xie, Y.; Zhang, Z.F.; Jiang, T.; He, J.L.; Han, B.X.; Wu, T.B.; Ding, K.L. "CO_2 cycloaddition reactions catalyzed by an ionic liquid grafted onto a highly cross-linked polymer matrix." ***Angew. Chem. Int. Ed.*** 2007, 46, 7255-7258.

(3) Ding, K.L.; Miao, Z.J.; Liu, Z.M.; Zhang, Z.F.; Han, B.X.; An, G.M.; Miao, S.D.; Xie, Y. "Facile Synthesis of High Quality TiO_2 Nanocrystals in Ionic Liquid Via A Microwave-Assisted Process." *J. Am. Chem. Soc*. 2007, 129, 6362-6363.

(2) Wang, J.Q.; Zhang, C.L.; Liu, Z.M.; Ding, K.L.; Yang, Z.Z. "A simple and efficient route to prepare inorganic compound/polymer composites in supercritical fluids." ***Macromol. Rapid Commun.*** 2006, 27, 787-792.

(1) Xu, Q.(*); Ding, K.L.; He, L.M.;, Li, J.B.; Guo, Y.Q.; Fan, H.J. "A new mechanism about the process of preparing nanoporous silica with activated carbon mold." *Mater. Sci. Eng. B* 2005, 121, 266-271.

PATENT

(1) **Ding, K.L.**; Stair, P.C. "Supported Metal Oxides for Olefin Metathesis and Related Methods." U.S. Patent (application number: 20160075617), filed in September 2015.

PRESENTATIONS

(4) **Ding, K.L.**; Stair, P.C. Oral presentation in ACS Spring Meeting (Mar 13 – 17, 2016, San Diego). Title: Activation, regeneration, and active site identification of oxide-based olefin metathesis catalysts.

(3) **Ding, K.L.**; Stair, P.C. Oral presentation in the 24th North American Meeting (NAM) of the Catalysis Society (Jun 14 – 19, 2015, Pittsburgh, PA). Title: Oxide-Based Olefin Metathesis Catalysts.

(2) **Ding, K.L.**; Johnson, A.; Stucky, G.D.; Stair, P.C. Oral presentation in ACS Spring Meeting (Mar 16 – 20, 2014, Dallas). Title: Atomic Layer Deposition of Transition Metals/Metal Oxides on Zeolite.

(1) **Ding, K.L.**; Stucky, G.D.; Metiu, H.; McFarland, E.W. Oral presentation in ACS Spring Meeting (Mar 25 – 29, 2012, San Diego). Title: Hydrodebromination of dibromomethane for bromine mediated Gas-To-Liquid technology.

PROFESSIONAL ACTIVITIES

Journal reviewer: 2012 – present

Catal. Sci. Technol., Chem. Commun., J. Mater. Chem., RSC Adv., CrystEngComm, New J. Chem., Dalton Trans.; Phys. Chem. Chem. Phys.