Jonathan Lloyd Male

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Education

Executive M. B. A.

2005 - present SUNY at Albany Albany, NY, USA

Ph. D.

1988 - 1996 Simon Fraser University Burnaby, BC, Canada

Dissertation title: The Investigation of Transition Metal Complexes containing a Dative Metal-Metal Bond

B. Sc. (Hons.)

1984 - 1988 Greenwich University Woolwich, SE London, UK

Professional Qualifications

Scientist

2006 - present Battelle Memorial Institute at PNNL WA, USA

- Developed future directions of NO_x emissions catalysis programs at PNNL

Manager of Quality Assurance

2005 - 2006 Applied Pharmaceutical Research, LLC. NY, USA

- Leader of quality for analytical laboratory and production facility in the development of an active pharmaceutical ingredient. Drove qualification and validation of the process for GMP/GLP.

Staff Scientist

2000 - 2005 GE Global Research Center Niskayuna, NY, USA

- FIELD OF RESEARCH: Catalysis and Implementation of High Throughput Screening Tools to Accelerate Research.

- Designed novel heterogeneous acidic catalysts for the production of bisphenol-A

- Implemented high-throughput robotic experiments to optimize homogenous & heterogeneous catalyst systems for the production and stabilization of diphenylcarbonate

- As part of a five month bridge assignment in Lexan Polycarbonate Technology, GE-Advanced Materials, Cartagena, Spain:

Led optimization of catalyst preparation and reaction on a large scale (>30 kg) and supervised analysis of reaction products in order ensure quality of results

- Drove design & building of flexible, 96-well screening reactor for harsh environments, facilitated $\geq$ 1000 experiments/week and established novel multi-metal oxide catalyst leads for selective catalytic reduction of NO_x

- Demonstrated leadership skills as acting team leader for both NO_x catalyst programs and facilitated successful transition to leaders & current efficient running of projects

- Drove the critical interactions of NO_x aftertreatment team interaction with both internal GE labs (Fuel Conversion Lab, Irvine; Diesel Lab, Niskayuna) & external labs with (Pacific Northwest National Lab).

- Generated and led new program for Catalytic Flame Nucleation

Professional Qualifications Continued

Postdoctoral Fellow

1998 - 2000 University of California, Berkeley Berkeley, CA, USA

- INORGANIC MATERIALS, Supervisors: Professor T. Don Tilley & Professor Alexis T. Bell

FIELD OF RESEARCH: Metal Alkoxide Precursors for the Preparation and Optimization of Xerogels as Heterogeneous Oxidative Dehydrogenation Catalysts

- Produced catalysts with improved initial selectivities & activities compared to “traditionally” fabricated materials

Postdoctoral Fellow

1995 - 1998 University of Oregon Eugene, OR, USA

FIELD OF RESEARCH: The Study of Solvent Cage Effects on Photochemically generated Organometallic Fragments

- Implemented photochemically generated organometallic radical fragments as polymer model complexes to probe their radical mechanisms & solvent dynamics.

Research and Development Technician

July 1986 - July 1987 London International Group plc. Cambridge, UK

- The redevelopment and assessment of latex products and lubricants

Additional Qualifications

2005 GE Business Strategy Workshop

2003 GE Green Belt 6σ- certified

2003 GE Financial Basics for Non-Financial Managers Course

2002 GE Project Management Course

2002 GE Robust Design Course

2001 AIChE Professional Course “Fundamentals of Chemical/Petroleum Processes For Non-Chemical Engineers”, 021

Honors and Awards

2005, 2004 Invited reviewer for DOE’s National Laboratory Advanced Combustion Engine R&D Merit Review

2004 GE Management award for serving as project leader for the NO_x catalysis programs

2004 Invited reviewer for the Catalytic Advances Program technical report “Accelerating Catalyst & Process Development Using High Throughput & Combinatorial Methods”

2003 GE Management award for outstanding technical contribution in the field of NO_x catalysis & development of the 96-well reactor

2002 “GE Hat’s Off” award for assisting in planning of new combinatorial labs in new building

2002 “GE Double Hat’s Off" award for accomplishments on the NO_x Catalysis Team

2002 "GE Hats Off" award for work on an Ultra-Low NO_x Emissions NIST Proposal

2001 “GE Hats Off” award for innovation, instigating and driving the role of the catalysis program in reduction of NO_x emissions from turbines

1993 The SFU Faculty of Science Teaching Assistant Award

Publications

Published 22 papers, 5 patents granted and 7 patent applications published.

Accelerated Catalyst Discovery. Male, J. L. 8th DOE Cross-Cut Lean Exhaust Emissions Reduction Simulation Workshop Univ. of Michigan, Dearborn, May 17-19, 2005.

Presentations

NO_x SelectiveCatalytic Reduction Over Ag Supported Catalysts: Effect of Preparation on Activity and Selectivity. Hancu, D.; Male, J. L, Soloveichik, G. L; Lemmon, J. P.; Benjamin R. Wood, B. R.; Grocela-Rocha, T.; Buddle, S. T.; Briel, L. J.; Redline, J. K.; Alison Palmatier, A. L.; Acharya, H. R.; Weistroffer, J. J. 19th North American Catalysis Society Meeting, Philadelphia, May 22-27, 2005, P-174.

Mechanistic Studies of Photochemically Degradable Polymers. Tyler, D. R.; Braden, D. A.; Parrack, E. E.; Male, J. L. 221st ACS National Meeting, San Diego, April 1-5, 2001, INOR-314.

Thermolysis of Metal Alkoxides in Organic Solvents for the Synthesis of Propane Oxidative Dehydrogenation Catalysts. Male, J. L.; Rulkens, R.; Tilley, T. D. 217th ACS National Meeting, Anaheim, March 21-25, 1999, CATL-014.

$OV[OSi(O^tBu)_3]_3$: A model Compound for Isolated Vanadia on Silica. Rulkens, R.; Tilley, T. D.; Male, J. L.; Terry, K.; Bell, A. T.; Olthof, B.; Iglesia, E.; Khodakov, A. 217th ACS National Meeting, Anaheim, March 21-25, 1999, COLL-133.

Comparison of Dative and Covalent Bonds Between Osmium and Rhenium. Einstein, F. W. B.; Jennings, M. C.; Male, J. L.; Pomeroy, R. K.; Barnett, S. M.; Butler, I. S. 75th Canadian Chemical Conference, Edmonton, May 31-June 4, 1992, 371 IN-D5P.

Restricted Rotation of the Arene Ligand in (η-Arene)$Fe(CO)(SiCl_3)_2$. Hansen, V. M.; Batchelor, R. J.; Einstein, F. W. B.; Male, J. L.; Pomeroy, R. K. 75th Canadian Chemical Conference, Edmonton, May 31-June 4, 1992, 357 IN-D5P.

Publications

Combinatorial discovery of metal co-catalysts for the carbonylation of phenol. Spivack, J. L.; Cawse, J. N.; Whisenhunt, D. W.; Johnson, B. F.; Shalyaev, K. V.; Male, J. L.; Pressman, E. J.; Ofori, J. Y.; Soloveichik, G. L.; Patel, B. P.; Chuck, T. L.; Smith, D. J.; Jordan, T. M.; Brennan, M. R.; Kilmer, R. J.; Williams, E. D. *Appl. Catal. A: General* **2003**, *254*, 5-25.

A Continuous and Clean One-Step Synthesis of Nano-Particulate $Cd_{1-x}Zr_xO_2$ Solid Solutions in near-Critical Water. Male, J. L.; Tyler, D. R. *Chemtracts – Inorganic Chemistry* **2001**, *14*, 48-53.

Thermolytic Molecular Precursor Route to Active and Selective Vanadia-Zirconia Catalysts for the Oxidative Dehydrogenation of Propane. Male, J. L.; Niessen, H. G.; Bell, A. T.; Tilley, T. D. *J. Catal*. **2000**, *194*, 431-444.

Effects of a Nonligating Pendant Hydrogen-Bonding Group in a Metal Complex: Stabilization of an HF Complex. Male, J. L.; Tyler, D. R. *Chemtracts – Inorganic Chemistry* **2000**, *13*, 139-144.

Vanadyl *tert*-Butoxy Orthosilicate, $OV[OSi(O^tBu)_3]_3$: A model for isolated Vanadyl Sites on Silica and a Precursor to Vanadia-Silica Xerogels. Rulkens, R.; Male, J. L.; Terry, K. W.; Olthof, B.; Khodakov, A.; Bell, A. T.; Iglesia, E.; Tilley, T. D. *Chem. Mater*. **1999**, *11*, 2966-2973.

Radical Cage Effects in the Photochemical Degradation of Polymers; In-Cage Trapping of Photochemically Generated Radical Cage Pairs in Polymer Model Compounds. Male, J. L.; Yoon, M.; Weakley, T. J. R.; Tyler, D. R. *Macromolecules* **1999**, *32*, 3898-3906.

The Effect of Radical Size and Mass on the Cage Recombination Efficiency of Photochemically Generated Radical Cage Pairs. Male, J. L.; Lindfors, B. E.; Covert, K. J.; Tyler, D. R. *J. Am. Chem. Soc*. **1998**, *120*, 13176-13186.

Publications Continued

Complexes Containing Unbridged Dative Metal-Metal Bonds and the Strong Acceptor $Ru(CO)_3(SiCl_3)_2$ Moiety. Comments on the Transition Metal to Silicon Bond. Jiang, F.; Male, J. L.; Biradha, K.; Leong, W. K.; Pomeroy, R. K.; Zaworotko, M. J. *Organometallics* **1998**, *17*, 5810-5819.

Spin State Change in Organometallic Reactions. Experimental and MP2 Theoretical Studies of the Thermodynamics and Kinetics of the CO and N_2 Addition to Spin Triplet $Cp^*MoCl(PMe_3)_2$. Male, J. L.; Tyler, D. R. *Chemtracts – Inorganic Chemistry* **1998**, *11*, 366-370.

Time-Resolved Infrared Spectral Studies of Photochemically Induced Oxidative Addition of Benzene to *trans*-$RhCl(CO)(PMe_3)_2$. Male, J. L.; Braden, D. A.; Tyler, D. R. *Chemtracts – Inorganic Chemistry* **1998**, *11*, 879-883.

Hexacarbonyl-1κ^3C,2κ^3C-bis{1,2(η^5)-1-[2-(trimethylsiloxy)ethyl]cyclopentadienyl}-dimolybdenum(Mo-Mo). Covert, K. J.; Male, J. L.; Tyler, D. R.; Weakley, T. J. R. *Acta Crystallogr., Sect. C* **1998**, *54*, 943-945.

Chlorotricyclohexylsilane, $C_{18}H_{33}ClSi$. Lindfors, B. E.; Male, J. L.; Tyler, D. R.; Weakley, T. J. R. *Acta Crystallogr., Sect. C* **1998**, *54*, 694-695.

Cage Effects in the Photochemical Degradation of Polymers. Studies of Model Complexes with Different Chain Lengths. Male, J. L.; Lindfors, B. E.; Covert, K. J.; Tyler, D. R., *Macromolecules* **1997**, *30*, 6404-6406.

Radical Cage Effects. Effect of Radical Mass and Bond Energies on Cage Recombination Efficiencies for Photochemical Cage Pair Intermediates of $[Mo_2(CO)_6(\eta^5\text{-}C_5H_4CH_2CH_2OSiMe_3)_2]$, $[Mo_2(CO)_6(\eta^5\text{-}C_5H_4Me)_2]$ and $[W_2(CO)_6(\eta^5\text{-}C_5H_4Me)_2]$. Lindfors, B. E.; Male, J. L.; Covert, K. J.; Tyler, D. R. *Chem. Commun*. **1997**, 1687-1688.

CIDNP in the Photolysis of Coenzyme B_{12} Model Complexes Suggesting That C-Co Bond Homolysis Occurs from the Singlet State. Male, J. L.; Braden, D. A.; Tyler, D. R., *Chemtracts – Inorganic Chemistry* **1997**, *10*, 908-912.

Photochemical Heterolysis of the Metal-Metal Bond in $(Me_3P)(OC)_4OsW(CO)_5$. Male, J. L.; Pomeroy, R. K.; Tyler, D. R. *Organometallics* **1997**, *16*, 3431-3438.

Products from the Photoreaction of $(Me_3P)(OC)_4OsW(CO)_5$ with CCl_4; Synthesis and Isomerization of $Os(CO)_3(PMe_3)Cl_2$. Male, J. L.; Einstein, F. W. B.; Leong, W. K.; Pomeroy, R. K.; Tyler, D. R. *J. Organomet. Chem*. **1997**, 549, 105-115.

Restricted Rotation about the Arene-Iron Bond in $(arene)Fe(CO)(SiCl_3)_2$ Complexes. Hansen, V. M.; Batchelor, R. J.; Einstein, F. W. B.; Male, J. L.; Pomeroy, R. K. Zaworotko, M. J. *Organometallics* **1997**, *16*, 4875-4881.

Arene-Manganese and Arene-Rhenium Compounds of Formula $(arene)M(CO)_2(SiCl_3)$. Hansen, V. M.; Male, J. L.; Pomeroy, R. K. *Can. J. Chem*. **1997**, *75*, 531-535.

Electronic Structure of $Os(CO)_4L$ (L = CO, PMe_3) Studied by Variable-Energy Photoelectron Spectroscopy. Hu, Y.-F.; Bancroft, G. M.; Davis, H. B.; Male, J. L.; Pomeroy, R. K.; Tse, J. S.; Tan, K. H. *Organometallics* **1996**, *15*, 4493-4500.

Photochemical Heterolysis of the Metal-Metal Bond in $(Me_3P)(OC)_4OsW(CO)_5$. Male, J. L.; Davis, H. B.; Pomeroy, R. K.; Tyler, D. R. *J. Am. Chem. Soc.* **1994**, *116*, 9353-9354.

Fourier Transform Infrared and Raman study of Metal Carbonyl Clusters - Distinction of Covalent and Dative Metal-Metal bonds. Barnett, S. M.; Brienne, S. H. R.; Butler, I. S.; Einstein, F. W. B.; Jennings, M. C.; Male, J. L.; Pomeroy, R. K. *Proc. SPIE - Int. Soc. Opt. Eng*. **1993**, *2089*, 554-555.

Patents

Gas Sensor Device. Sandvik, P. M.; Tilak, V.; Tucker, J.; Weaver, S. E.; Shaddock, D. M.; Male, J. L.; Lemmon, J. P.; Woodmansee, M. A.; Manivannan, V.; Haitko, D. A. U.S. Pat. 7,053,425 May 30, 2006.

Bromination of Hydroxyaromatic Compounds and Further Conversion to Dihydroxyaromatic Compounds. Pressman, E. J.; Ofori, J. Y.; Soloveichik, G. L.; Mills, R. C.; Male, J. L. U.S. Pat. 7,045,666 May 16, 2006.

Functionalized Zeolite Compositions, Their Preparation and Use. Kishan, G.; Vetrivel, R.; Kukalyekar, N. P.; Dhalla, A. M.; Male, J. L.; Spivack, J. L.; Ramaswamy, A. V.; Singh, A. P. U.S. Pat. 7,041,774 May 9, 2006.

Method for Preparation of para-Brominated Hydroxyaromatic Compounds. Pressman, E. J.; Male, J. L.; Mills, R. C.; Ofori, J. Y. U.S. Pat. Appl. Publ. 2005, U.S. Pat. 6,982,356 January 3, 2006.

Method for Reducing Aromatic Carbonate Ester Decomposition in Reaction Mixtures. Shalyaev, K. V.; Pressman, E. J.; Hallgren, J. E.; Ofori, J. Y.; Male, J. L. U.S. Pat. 6,441,215 August 27, 2002.

Catalyst System and Method for the Reduction of NO_x. Rocha, T. G.; Male, J. L.; Redline, J. K.; Palmatier, A. L.; Chen, K.; Hancu, D.; Soloveichik, G. L.; Budesheim, E.; Simon, A. J. U.S. Pat. Appl. Publ. 2005, US 20050137083 A1.

Method and System for Emission Control of a Compression Ignition Locomotive Engine Soliman, S. S.; Primus, R. J.; Tamma, B.; Male, J. L.; Furman, A. H.; Alvarez, J. C. U.S. Pat. Appl. Publ. 2006, US 20060096273 A1.

Catalyst system and method for the reduction of NO_x. Male, J. L.; Soloveichik, G. L.; Palmatier, A. L.; Hancu, D.; Warner, G. L.; Redline, J. K.; Budesheim, E. G.; Rocha, T. G. . U.S. Pat. Appl. Publ. 2006, US 20060133976 A1.

Catalyst system and method for the reduction of NO_x. Male, J. L.; Soloveichik, G. L.; Palmatier, A. L.; Rocha, T. G.; Hancu, D.; Warner, G. L.; Redline, J. K.; Budesheim, E. G.; Chen, K.; Buddle, S. T. U.S. Pat. Appl. Publ. 2006, US 20060133977 A1.

Exhaust Stream Treatment. Rocha, T. G.; Palmatier, A. L.; Male, J. L.; Blouch, J. D.; Wood, B. R.; Vitse, F. U.S. Pat. Appl. Publ. 2007, US 20070009412 A1.

Conversion System for Reducing NO_x Emissions. Liu, K.; Frydman, A.; Zamansky, V.; Rocha, T. G.; Male, J. L.; Acharya, H. R.; Primus, R. J. U.S. Pat. Appl. Publ. 2007, US 20070000243 A1.

Method and System for Regeneration of a Catalyst. Liu, K.; Male, J. L.; Frydman, A.; Primus, R. J.; Zamansky, V.; Rocha, T. G. U.S. Pat. Appl. Publ. 2007, US 20070000239 A1.