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Curriculum Vitae for Professor Mark Stradiotto

ACADEMIC HISTORY

Dalhousie University, Department of Chemistry 2001-present
Halifax, Nova Scotia, Canada
Professor (2009-present)
Associate Professor (2006-2009)
Assistant Professor (2001-2006)

University of California at Berkeley, Department of Chemistry 1999-2001
Berkeley, California, U. S. A.
Natural Sciences and Engineering Research Council of Canada Postdoctoral Fellow

McMaster University, Department of Chemistry 1999
Hamilton, Ontario, Canada
Doctor of Philosophy

McMaster University, Faculty of Science 1995
Hamilton, Ontario, Canada
Bachelor of Science, Honours Applied Chemistry (with distinction)

SELECTED HONOURS (2003-present)

Faculty of Science Killam Research Professorship 2011-2016
for outstanding achievement in research

Named to the Editorial Advisory Board for the ACS Journal "Organometallics" 2010-2013

Synlett/Synthesis Promising Young Professor Journal Awardee 2009
Editorial Board of the Journals "*Synthesis*" and "*Synlett*" (Thieme Publishers)
for outstanding achievement in promise in synthetic chemistry research

Harry Shirreff Prize for Excellence in Research in Chemistry 2006-2008
Dalhousie University

Dalhousie Innovation Award 2006
Dalhousie University, the Office of Economic Development for Nova Scotia,
the IWK Health Centre, and the Capital District Health Authority
for outstanding achievement in research with commercial potential

"Teacher of the Year" Award 2005 (& 2002)
Dalhousie University Undergraduate Chemistry Society, Dalhousie University

Dalhousie University Killam Prize for Research Excellence 2005
Supported by the Killam Foundation and Dalhousie University
in recognition of outstanding independent research productivity

Canadian National Committee for IUPAC Travel Award 2003
Supported by Merck Frosst Canada Inc., and Bio-Mega Boehringer Ingelheim Ltd.
in recognition of outstanding achievement in independent research

Curriculum Vitae for Dr. Mark Stradiotto (Professor)
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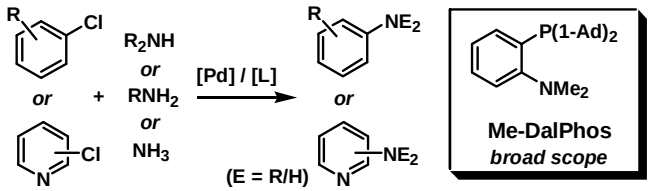
RESEARCH

Overview. Research efforts in the Stradiotto group are directed toward developing new classes of ancillary ligands/transition metal complexes that exhibit interesting and unusual reactivity, with the goal of incorporating such reactivity into useful substrate transformations. Our research program is focused on the development of: highly effective ancillary ligands for use in challenging cross-coupling reactions, including Buchwald-Hartwig aminations involving ammonia and hydrazine; new late metal catalyst complexes for the hydroamination of unsaturated substrates; and zwitterionic relatives of more traditional cationic late metal complexes, in anticipation that these may prove useful in a range of catalytic substrate transformations. Key themes that link these programs include: the establishment of innovative ligation strategies for use in constructing reactive metal complexes; the evaluation of structure-activity relationships including mechanistic studies to guide the development of increasingly reactive complexes; and the development of new and synthetically useful substrate transformations. Eight ligands and catalysts developed in the Stradiotto group have been commercialized, and this research has attracted funding from local, regional, national, international, and industrial sources ($1.9M since 2001 for exclusive use by the Stradiotto group, and an additional $2.1M in collaborative grants).

Highlights of Selected Significant Contributions to Research (2003-2011).

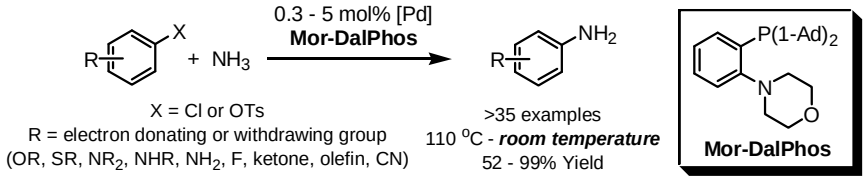
1. New "DalPhos" Ligands: State-of-the-Art Performance in Challenging Cross-Coupling Chemistry
Relevant publications: Stradiotto and co-workers (publication number from list below): (61) *Chem. Eur. J.* **2010**; (63) *Angew. Chem. Int. Ed.* **2010**; (67) *Angew. Chem. Int. Ed.* **2010**; (71) *J. Am. Chem. Soc.* **2011**; (72) *Chem. Commun.* **2011**; (73) *Synlett* **2011**.

(a) "A Highly Versatile Catalyst System for the Cross-Coupling of Aryl Chlorides and Amines"



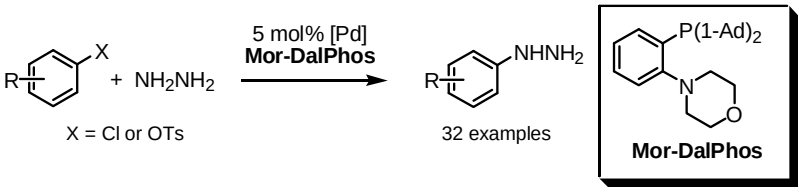
Summary and significance: The Pd-catalyzed cross-coupling of aryl halides and N-H containing compounds (Buchwald-Hartwig coupling) has emerged as key tool for the construction of C-N bonds in organic synthesis. Despite significant research effort, a universal catalyst that can couple the broad spectrum of potential amine partners with aryl halides is not known. In a recent report (CEJ 2010-61) we disclosed the Me-DalPhos ligand; this ligand exhibits the broadest scope of any single ligand for Buchwald-Hartwig coupling, enabling the Pd-catalyzed cross-coupling of aryl chlorides to a diverse range of amine substrates at low loadings with excellent functional group tolerance and chemoselectivity.

(b) "A P,N-Ligand for Palladium-Catalyzed Ammonia Arylation: Coupling of Deactivated Aryl Chlorides, Chemoselective Arylations, and Room Temperature Reactions"



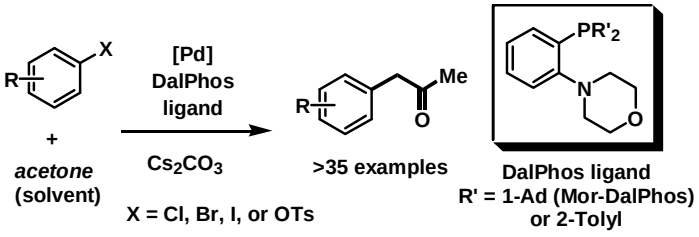
Summary and significance: Despite recent progress in the development of catalysts for Buchwald-Hartwig aminations, catalysts that can mediate the arylation of ammonia, the most appealing of all nitrogen-containing substrates, are extremely rare. Building on the success of our Me-DalPhos ligand, we subsequently disclosed the Mor-DalPhos ligand (ANGEW 2010-63), which represents the state-of-the-art in Pd-catalyzed ammonia cross-coupling. A diversity of aryl (pseudo)halides can be coupled using Pd/Mor-DalPhos mixtures, including challenging electron-rich species lacking *ortho*-substitution. The unique preference for ammonia coupling when using Pd/Mor-DalPhos can be exploited in unprecedented chemoselective arylations, and for the first time the room temperature Pd-catalyzed cross-coupling of ammonia has been achieved. We subsequently demonstrated, for the first time, that selective ammonia (or hydrazine, see below) monoarylation can be incorporated into the synthesis of substituted indoles via tandem cross-coupling–alkyne cyclization (CC 2011-72).

(c) "Palladium-Catalyzed Cross-Coupling of Aryl Chlorides and Tosylates with Hydrazine"



Summary and significance: Aryl hydrazines are highly valuable intermediates in the synthesis of a number of important nitrogen heterocyclic frameworks such as indoles (via Fischer indole synthesis), indazoles, arylpyrazoles, and aryltriazoles. Whereas the transition metal catalyzed cross-coupling of aryl halides and hydrazine represents an attractive alternative to traditional aryl hydrazine synthesis, prior to our work, no such process had been reported in the literature. Building on the remarkable reactivity of our Mor-DalPhos-based catalysts with ammonia, we have more recently demonstrated that Pd/Mor-DalPhos mixtures can be employed in the arylation of hydrazine – a previously unknown and highly sought-after chemical transformation (ANGEW 2010-67).

(d) "Palladium-Catalyzed Mono-α-Arylation of Acetone with Aryl Halides and Tosylates"



Summary and significance: The transition metal-catalyzed α-arylation of carbonyl and related compounds has emerged as a useful and powerful strategy for the formation of sp^3-sp^2 C-C bonds. However, despite considerable research efforts, the selective monoarylation of acetone (the simplest ketone substrate) employing a broad range of unbiased aryl halides represented a persistent challenge that had yet to be addressed prior to our work in the field. Building on our success in C-N cross-coupling, we reported (JACS 2011-71) the first example of selective, Pd-catalyzed mono-α-arylation of acetone employing aryl chlorides, bromides, iodides, and tosylates. The use of appropriately designed DalPhos P,N-ligands (including Mor-DalPhos) proved to be key to controlling reactivity and selectivity.

Academic and Industrial Signficance of Our DalPhos-Based Catalysts: Motivated by overwhelming interest from the pharmaceutical industry, the Stradiotto group has submitted provisional patents covering the DalPhos ligand family (full patent submissions scheduled for Nov 2011), and we have established commercialization agreements with Sigma-Aldrich, Strem Chemicals, and Digital Specialty Chemicals for the production and sale of these ligands on research (multi-gram) and industrial (multi-kilogram) scales. Furthermore, the importance of these publications from my group has already been noted in three highlights in *Synfacts* (Knochel, **2010**), as a *SynStory* (Zanda, **2011**), in four critical reviews (Buchwald, *Chem. Sci.* **2011**; Hartwig, *Angew. Chem.* **2010**; van der Vlugt, *Chem. Soc. Rev.* **2010**; Renaud, *Chem. Soc. Rev.* **2010**), in the trade magazines *Pharmaceutical Technology* (**2010**), *Platinum Today* (**2010**) and *GalChimia* (**2010**), as well as in two articles in *Chemical and Engineering News* (**2010**, *88*(21), 32 and **2010**, *88*(42), 8). A passage from one C&EN article regarding our ammonia chemistry reads: *"The reactivity and selectivity of Mor-DalPhos with ammonia at room temperature "is remarkable," says John F. Hartwig of the University of Illinois, Urbana-Champaign* [now U.C. Berkeley]. *Stradiotto's group has found a ligand "sweet spot" for C–N coupling between tightly bound bidentate bisphosphines and labile hindered monodentate phosphines, Hartwig adds."* We have also demonstrated that the DalPhos ligand family is useful in other transformations, including Au-mediated alkyne hydroamination (e.g. Stradiotto and co-workers *J. Am. Chem. Soc.* **2010**; see **B** below). Given the widespread academic and industrial interest in this research, Prof. Stradiotto was selected by *Chemical and Engineering News* and Sigma-Aldrich to give a web-based seminar (Webinar) on this research (University of Ottawa, October 2011).

2. Addressing Reactivity Challenges in Metal-Mediated Hydroamination Catalysis

Relevant publications: Stradiotto and co-workers (publication number from list below): (56) *Org. Lett.* **2009**; (60) *J. Am. Chem. Soc.* **2010**; (62) *Can. J. Chem.* **2010**; (65) *ChemCatChem.* **2010**; (68) *Organometallics* **2010**; (69) *J. Am. Chem. Soc.* **2010**; (72) *Chem. Commun.* **2011**; (73) *Synlett* **2011**.

(a) "New Late Metal Hydroamination Catalysts: Broad Substrate Scope and Mechanism"

Summary and significance: Current interest in the identification of catalysts for the hydroamination of unactivated alkene substrates arises from the utility of such C-N bond-forming reactions as an atom-economical route to synthetically useful nitrogen compounds. We have demonstrated (OL 2009-56, JACS 2010-60) that $[Ir(COD)Cl]_2$ is a remarkably effective pre-catalyst for the hydroamination of unactivated alkenes that exhibits remarkably broad substrate scope in cyclohydroamination (primary and secondary alkyl/arylamines at low Ir loadings). In the quest to develop mechanistic insight into these transformations, a comprehensive experimental and computational investigation was conducted; notably, this represents the first such combined mechanistic study of the late metal-mediated cyclohydroamination of unactivated alkenes to appear in the literature. We have subsequently demonstrated (OM 2010-68) that phosphine-free Pt complexes such as $(COD)PtCl_2$ are also capable of mediating the cyclohydroamination of primary and secondary alkyl/arylamines.

(b) "Stereo- and Regioselective Gold-Catalyzed Hydroamination of Alkynes with Dialkylamines"

Summary and significance: In building on our efforts to expand the synthetic repertoire of metal-mediated hydroamination through the pursuit of late metal pre-catalysts that address unmet challenges in hydroamination catalysis, we have identified a gold pre-catalyst featuring Mor-DalPhos that has significantly extended the substrate scope and synthetic utility of alkyne hydroamination (JACS 2010-69). This pre-catalyst represents the only system documented for the stereoselective addition of a range of functionalized dialkylamines to internal alkynes, and the hydroamination of unsymmetrical internal aryl acetylenes with dialkylamines has been achieved with synthetically useful regioselectivities. The importance of this work from my group was highlighted in a *Synfacts* article (Yamamoto and Li, **2011**).

(c) "Palladium-Catalyzed Synthesis of Indoles via Ammonia Cross-Coupling-Alkyne Cyclization"

Summary and significance: Despite considerable research efforts directed towards the metal-catalyzed synthesis of the highly sought-after indole framework, the direct use of ammonia in such transformations had not been reported prior to our work. In combining our interests in ammonia arylation and hydroamination catalysis, we have developed a straightforward method for the synthesis of 2-arylindoles directly from ammonia through a tandem cross-coupling/alkyne hydroamination sequence (CC 2011-72); additionally, methylamine and hydrazine have been shown to be suitable reaction partners. The importance of this work from my group was highlighted in a *Synfacts* article (Snieckus and Hurst, **2011**).

3. Novel Zwitterionic Alternatives to More Traditional Cationic Late Metal Catalysts

Relevant publications: Stradiotto and co-workers (publication number from list below): (24) *J. Am. Chem. Soc.* **2003**; (25) *Organometallics* **2003**; (29) *Organometallics* **2005**; (30) *Angew. Chem. Int. Ed.* **2005**; (31) *Organometallics* **2005**; (32) *Chem. Commun.* **2005**; (35) *Organometallics* **2006**; (37) *Inorg. Chem.* **2006**; (39) *Organometallics* **2006**; (40) *Organometallics* **2007**; (42) *Angew. Chem. Int. Ed.* **2007**; (43) *J. Am. Chem. Soc.* **2007**; (46) *J. Am. Chem. Soc.* **2007**; (47) *Chem. Commun.* **2008**; (48) *Organometallics,* **2008**; (51) *Chem. Commun.,* **2008**; (52) *J. Am. Chem. Soc.* **2008**; (53) *Organometallics* **2008**; (54) *Organometallics* **2009**; (57) *J. Organomet. Chem.* **2009**; (59) *Angew. Chem. Int. Ed.* **2010**; (73) *Synlett* **2011**.

Summary and significance: The Stradiotto research group has pioneered the development of non-borato platinum-group metal zwitterionic complexes, which feature a formally cationic metal fragment that is counterbalanced by a 10π indenide unit sequestered within the ancillary ligand backbone (ANGEW 2010-59). Extensive structural and catalytic investigations reveal these zwitterionic catalysts to be complementary to more traditional cations in terms of catalytic performance and solubility properties. Our contributions to group 9

catalysis included the first catalytically active (κ^2-*P*,*N*)Rh zwitterion (JACS 2003-24), and the first zwitterionic analogue of Crabtree's catalyst (CC 2005-32). We have also reported a Ru zwitterion that is one of the most active transfer hydrogenation catalysts known (ANGEW 2007-42, identified as a '*Hot Paper*' by the editors). We have commercialized six of our P,N-indene ligands and group 9 catalysts.

4. Non-Traditional Catalyst Systems for E-H Bond Additions to Unsaturated Substrates
Relevant publications: Stradiotto and co-workers (publication number from list below): (33) *Organometallics* **2006**; (38) *Chem. Comm.* **2006**; (41) *Organometallics* **2007**; (44) *Organometallics* **2007**; and (50) *Chem. Eur. J.* **2008**.

Summary and significance: The Stradiotto group is targeting new classes of organometallic catalysts that challenge accepted paradigms in the field of E-H bond activation, in anticipation that such complexes may provide access to reactivity patterns that cannot be achieved by use of more traditional catalysts. In this vein, we disclosed the first example of Ag-mediated hydrosilylation (CC 2006-38), and have examined Au-catalyzed hydrosilylation with a focus on understanding the influence of supporting ligands (OM 2007-41). We have also made breakthroughs in Ir-catalyzed hydrogenation and transfer hydrogenation (OM 2006-33; OM 2007-44); despite the preponderance of evidence suggesting that Ir complexes must be cationic in order to function as alkene hydrogenation catalysts, we have demonstrated that neutral Ir-phosphinoenolate species can reduce alkenes under mild conditions (~1 atm H_2, 22 ºC). We have also reported (CEJ 2008-50) on our discovery that $[(COD)Ir(\kappa^2\text{-}P,N\text{-}L)]^+PF_6^-$ (L = (*o*-^{t}Bu$_2$P-C$_6$H$_4$)NMe$_2$) affords a remarkably active Ir catalyst for ketone transfer hydrogenation, providing high conversions and TOFs for a range of ketones at low Ir loadings. Such activity approaches that of the best transfer hydrogenation catalysts known, including more conventional Ru-amido species.

5. Fundamental Studies of Organometallic Reactivity Pertaining to E-H Bond Activation
Relevant publications: Stradiotto and co-workers (publication number from list below): (30) *Angew. Chem. Int. Ed.* **2005**; (31) *Organometallics* **2005**; (43) *J. Am. Chem. Soc.* **2007**; (46) *J. Am. Chem. Soc.* **2007**; (52) *J. Am. Chem. Soc.* **2008**; (71) *Inorg. Chem.* **2011**.

Summary and significance: In addition to the above-mentioned catalytic investigations, the Stradiotto group has also made novel contributions to advancing the understanding of organometallic structure, bonding and reactivity, including: the first observation of reversible α-hydride elimination at Ru (ANGEW 2005-30); the first example of carbanion hemilability (JACS 2007-43); rare examples of double geminal Si-H (JACS 2007-46) and B-H (IC 2011-70) bond activation; and the novel metal-ligand cooperative activation of silanes (JACS 2008-52).

PATENTS

The Stradiotto group has three submitted patents, covering the DalPhos ligand family (US Patent and Trademark Office Application Numbers: 61/415,032; 61/415,061; and 61/415,092).

REFEREED PUBLICATIONS

A = Article; C = Communication/Letter; N = Note; R = Review; H = Highlight; I = Invited

The **50** publications marked with an asterisk (*) are independent contributions from the Stradiotto group that have appeared in peer-reviewed journals.

(73*) (**R,I**) "Design of New P,N "DalPhos" Ligands: Applications in Transition Metal Catalysis." R. J. Lundgren, K. D. Hesp, and **Mark Stradiotto*** (*Synlett,* **2011**, 2443-2458).

(72*) (**C**) "Palladium-Catalyzed Synthesis of Indoles via Ammonia Cross-Coupling-Alkyne Cyclization." P. G. Alsabeh, R. J. Lundgren, L. E. Longobardi, and **Mark Stradiotto*** (*Chem. Commun.,* **2011**, *47*, 6936-6938).

(71*) (**C**) "Palladium-Catalyzed Mono-α-Arylation of Acetone with Aryl Halides and Tosylates." K. D. Hesp, R. J. Lundgren, and **Mark Stradiotto*** (*J. Am. Chem. Soc.,* **2011**, *133*, 5194-5197).

(70*) (**A**) "Probing Mesitylborane and Mesitylborate Ligation Within the Coordination Sphere of $Cp^*Ru(PiPr_3)^+$: A Combined Synthetic, X-Ray Crystallographic, and Computational Study." K. D. Hesp, F. O. Kannemann, M. A. Rankin, R. McDonald, M. J. Ferguson, and **Mark Stradiotto*** (*Inorg. Chem.,* **2011**, *50*, 2431-2444).

(69*) (**C**) " Stereo- and Regioselective Gold-Catalyzed Hydroamination of Internal Alkynes with Dialkylamines." K. D. Hesp and **Mark Stradiotto*** (*J. Am. Chem. Soc.,* **2010**, *132*, 18026-18029).

(68*) (**N**) "Platinum-Catalyzed Alkene Cyclohydroamination: Evaluating the Utility of Bidentate P,N/P,P Ligation and Phosphine-Free Catalyst Systems." C. B. Lavery, M. J. Ferguson, and **Mark Stradiotto*** (*Organometallics,* **2010**, *29*, 6125-6128).

(67*) (**C**) "Palladium-Catalyzed Cross-Coupling of Aryl Chlorides and Tosylates with Hydrazine." R. J. Lundgren and **Mark Stradiotto*** (*Angew. Chem. Int. Ed.,* **2010**, *49*, 8686-8690). This publication was featured as an *Article* in Chemical and Engineering News **2010**, *88*(42), 8.

(66*) (**H**) " Transition Metal-Catalyzed Trifluoromethylation of Aryl Halides." R. J. Lundgren and **Mark Stradiotto*** (*Angew. Chem. Int. Ed.,* **2010,** *49*, 9322-9324).

(65*) (**R,I**) "Rhodium- and Iridium-Catalyzed Hydroamination of Alkenes." K. D. Hesp and **Mark Stradiotto*** (*ChemCatChem,* **2010**, *2*, 1192-1207).

(64*) (**N,I**) "Rhodium Phosphino-enolate Complexes as Chemo- and Regioselective Catalysts for the Hydroformylation of Styrenes." Y.-S. Uh, A. Boyd, V. R. Little, P. G. Jessop,* K. D. Hesp, J. Cipot-Wechsler and **Mark Stradiotto*** (*J. Organomet. Chem.,* **2010**, *695*, 1869-1872*;* invited contribution to the thematic issue "Catalytic addition of E-H bonds to non-activated carbon-carbon multiple bonds").

(63*) (**C**) "A P,N-Ligand for Pd-Catalyzed Ammonia Arylation: Coupling of Deactivated Aryl Chlorides, Chemoselective Arylations, and Room Temperature Reactions." R. J. Lundgren, B. D. Peters, P. G. Alsabeh, and **Mark Stradiotto*** (*Angew. Chem. Int. Ed.,* **2010**, *49*, 4071-4074). This publication was featured as a *Science Concentrate* in Chemical and Engineering News **2010**, *88*(21), 32.

(62*) (**A,I**) "Intramolecular Hydroamination of Unactivated Alkenes with Secondary Alkylamines Catalyzed by Iridium Phosphino-phenolate Complexes." K. D. Hesp, R. McDonald, and **Mark Stradiotto*** (*Can. J. Chem.,* **2010**, *88*, 700-708*;* invited contribution to issue in honour of Russell Boyd).

(61*) (**A**) "A Highly Versatile Catalyst System for the Cross-Coupling of Aryl Chlorides and Amines." R. J. Lundgren, A. Sappong-Kumankumah, and **Mark Stradiotto***. (*Chem. Eur. J.,* **2010**, *16*, 1983-1991). This publication was featured as a *Science Concentrate* in Chemical and Engineering News **2010**, *88*(21), 32.

(60*) (**A**) "$[Ir(COD)Cl]_2$ as a Catalyst Precursor for the Intramolecular Hydroamination of Unactivated Alkenes with Primary Amines and Secondary Alkyl- or Arylamines: A Combined Catalytic, Mechanistic and Computational Investigation." K. D. Hesp, S. Tobisch, and **Mark Stradiotto*** (*J. Am. Chem. Soc.,* **2010**, *132*, 413-426).

(59*) (**R**) "Zwitterionic Relatives of Cationic Platinum Group Metal Complexes: Applications in Stoichiometric and Catalytic σ-Bond Activation." **Mark Stradiotto***, K. D. Hesp, and R. J. Lundgren. (*Angew. Chem. Int. Ed.,* **2010**, *49*, 494-512).

(58*) (**A**) "Exploring the Reactivity of a Coordinatively Unsaturated Cp*Ru(κ^2-*P*,*O*) Complex with Small Molecule Substrates: Application in E-H Bond Activation (E = H, B, and Si)." M. A. Rankin, K. D. Hesp, G. Schatte, R. McDonald, and **Mark Stradiotto***. (*Dalton Trans.,* **2009**, 4756-4765).

(57*) (**N**) "Synthesis, Characterization, and Catalytic Application of a New Chiral P,N-Indene Ligand Derived from (*R*)-BINOL." D. Wechsler, G. Schatte, and **Mark Stradiotto***. (*J. Organomet. Chem.*, **2009**, *694*, 1943-1947).

(56*) (**C**) "Intramolecular Hydroamination of Unactivated Alkenes with Secondary Alkyl- and Arylamines Employing $[Ir(COD)Cl]_2$ as a Catalyst Precursor." K. Hesp and **Mark Stradiotto***. (*Org. Lett.*, **2009**, *11*, 1449-1452).

(55*) (**A, I**) "Exploring the Utility of a New Chiral Phosphoramidite P,N-Ligand Derived from (*R*)-BINOL and 7-Azaindole in Asymmetric Catalysis." D. Wechsler and **Mark Stradiotto***. (*Can. J. Chem.*, **2009**, *87,* 72-79; issue in honour of Richard Puddephatt).

(54*) (**A**) "Probing the Dynamics and Reactivity of a Stereochemically Non-Rigid Cp*Ru(H)(κ^2-*P*,*C*arbene) Complex." M. A. Rankin, D. F. MacLean, R. McDonald, M. J. Ferguson, M. D. Lumsden, and **Mark Stradiotto***. (*Organometallics,* **2009**, *28*, 74-83).

(53*) (**A**) "Indenyl Hemilability: Unveiling a Masked (η^5-C_5Me_5)Ru(κ^2-*P*,*C*arbene) Zwitterion Via Facile and Reversible Ru-C(sp^3) Bond Cleavage." M. A. Rankin, G. Schatte, R. McDonald, and **Mark Stradiotto***. (*Organometallics,* **2008**, *27*, 6286-6299).

(52*) (**A**) "New Cationic and Zwitterionic Cp*M(κ^2-*P*,*S*) Complexes (M = Rh, Ir): Divergent Reactivity Pathways Arising from Alternative Modes of Ancillary Ligand Participation in Substrate Activation." K. D. Hesp, R. McDonald, M. J. Ferguson, and **Mark Stradiotto***. (*J. Am. Chem. Soc.,* **2008**, *130*, 16394-16406).

(51*) (**C**) "(κ^2-P,S)Pt(benzyl) Complexes Derived from 1/3-$PiPr_2$-2-StBu-Indene: Facile Synthesis of Carbanion- and Borate-Containing Zwitterions." K. D. Hesp, R. McDonald, M. J. Ferguson, G. Schatte, and **Mark Stradiotto***. (*Chem. Commun.,* **2008**, 5645-5647).

(50*) (**A**) "Rapid Ketone Transfer Hydrogenation Employing Simple, In Situ Prepared Iridium(I) Pre-catalysts Supported by 'Non N-H' P,N-Ligands." R. J. Lundgren and **Mark Stradiotto***. (*Chem. Eur. J.,* **2008**, *14,* 10388-10395).

(49*) (**C**) "Synthesis and Characterization of a Cationic Ruthenium Complex Featuring an Unusual Bis(η^2-B-H) Monoborane Ligand." K. D. Hesp, M. A. Rankin, R. McDonald, and **Mark Stradiotto***. (*Inorg. Chem.,* **2008**, *47*, 7471-7473).

(48*) (**A**) "Neutral, Cationic, and Zwitterionic Ru(II) Atom Transfer Radical Addition Catalysts Supported by P,N-Substituted Indene or Indenide Ligands." R. J. Lundgren, M. A. Rankin, R. McDonald, and **Mark Stradiotto***. (*Organometallics,* **2008**, *27*, 254-258).

(47*) (**C**) "Reactivity of a Coordinatively Unsaturated Cp*Ru(κ^2-*P*,*O*) Complex." M. A. Rankin, K. D. Hesp, G. Schatte, R. McDonald, and **Mark Stradiotto***. (*Chem. Commun.,* **2008**, 250-252).

(46*) (**A**) "Silylene Extrusion from Organosilanes via Double Geminal Si-H Bond Activation by a Cp*Ru(κ^2-*P*,*N*)$^+$ Complex: Observation of a Key Stoichiometric Step in the Glaser-Tilley Alkene Hydrosilylation Mechanism." M. A. Rankin, D. F. MacLean, G. Schatte, R. McDonald, and **Mark Stradiotto***. (*J. Am. Chem. Soc.,* **2007**, *129*, 15855-15864).

(45*) (**A**) "New Racemic Planar-Chiral Metalloligands Derived from Donor-Substituted Indenes: A Synthetic, Structural, and Catalytic Investigation." D. Wechsler, M. A. Rankin, R. McDonald, M. J. Ferguson, G. Schatte, and **Mark Stradiotto***. (*Organometallics,* **2007**, *26*, 6418-6427).

(44*) (**A**) "Exploring the Utility of Neutral Rhodium and Iridium κ^2-*P*,*O* and κ^2-P(*S*),*O* Complexes as Catalysts for Alkene Hydrogenation and Hydrosilylation." K. D. Hesp, D. Wechsler, J. Cipot, A. Myers, R. McDonald, M. J. Ferguson, G. Schatte, and **Mark Stradiotto***. (*Organometallics,* **2007**, *26*, 5430-5437).

(43*) (**C**) "Remarkably Facile and Reversible Ru-C(sp^3) Bond Cleavage to Give a Reactive 16-Electron Cp*Ru(κ^2-*P*,*C*arbene) Zwitterion." M. A. Rankin, G. Schatte, R. McDonald, and **Mark Stradiotto***. (*J. Am. Chem. Soc.,* **2007**, *129*, 6390-6391).

(42*) (**C**) "A Remarkably Active, Formally Zwitterionic Ru Catalyst Precursor for the Transfer Hydrogenation of Ketones that Does Not Feature an Ancillary Ligand N-H Functionality." R. J. Lundgren, M. A. Rankin, R. McDonald, G. Schatte, and **Mark Stradiotto***. (*Angew. Chem. Int. Ed.,* **2007**, *46*, 4732-4735). Identified as a '*Hot Paper*' by the journal editors.

(41*) (**A**) "Au(I) Complexes Supported by Donor-Functionalized Indene Ligands: Synthesis, Characterization, and Catalytic Behavior in Aldehyde Hydrosilylation." B. M. Wile, R. McDonald, M. J. Ferguson, and **Mark Stradiotto***. (*Organometallics,* **2007**, *26*, 1069-1076).

(40*) (**A**) "Cationic and Formally Zwitterionic Rh(I) and Ir(I) Derivatives of a P,N-Substituted Indene: A Comparative Synthetic, Structural, and Catalytic Investigation." J. Cipot, R. McDonald, M. J. Ferguson, G. Schatte, and **Mark Stradiotto***. (*Organometallics,* **2007**, *26*, 594-608).

(39*) (**N**) "Catalytic Alkene Hydroboration Mediated by Cationic and Formally Zwitterionic Rhodium(I) and Iridium(I) Derivatives of a P,N-Substituted Indene." J. Cipot, C. M. Vogels, R. McDonald, S. A. Westcott*, and **Mark Stradiotto***. (*Organometallics,* **2006**, *25*, 5965-5968).

(38*) (**C**) "Silver-Catalyzed Hydrosilylation of Aldehydes." B. M. Wile and **Mark Stradiotto***. (*Chem. Commun.,* **2006**, 4104-4106).

(37*) (**A**) "Rh(I) and Ir(I) Derivatives of a P(S),N-Substituted Indene Ligand: Synthetic, Structural, and Catalytic Alkene Hydrosilylation Studies." D. Wechsler, A. Myers, R. McDonald, M. J. Ferguson, and **Mark Stradiotto***. (*Inorg. Chem.,* **2006**, *45*, 4562-4570).

(36) (**A**) "Rhodium Complexes Containing a Tridentate Bis(8-quinolyl)methylsilyl Ligand: Synthesis and Reactivity" P. Sangtrirutnugul, **Mark Stradiotto**, and T. D. Tilley*****. (*Organometallics,* **2006**, *25*, 1607-1617).

(35*) (**A**) "Neutral and Cationic Pt(II) Complexes Supported by a P,N-Functionalized Indene Ligand: Structural and Reactivity Comparisons with a Related Au(III) Zwitterion." B. M. Wile, R. J. Burford, R. McDonald, M. J. Ferguson, and **Mark Stradiotto***. (*Organometallics,* **2006**, *25*, 1028-1035).

(34*) (**A**, **I**) "Exploring the Utility of Neutral Rh(I) and Ir(I) κ^2-(*P*,*O*)MCOD Catalyst Complexes for the Addition of Triethylsilane to Styrene." J. Cipot, M. J. Ferguson, and **Mark Stradiotto***. (*Inorg. Chim. Acta,* **2006**, *359*, 2780-2785; issue in honour of Brian James).

(33*) (**C**) "A Rare Example of Efficient Alkene Hydrogenation Mediated by a Neutral Ir(I) Complex." J. Cipot, R. McDonald, and **Mark Stradiotto***. (*Organometallics,* **2006**, *25*, 29-31).

(32*) (**C**) "New Bidentate Cationic and Zwitterionic Relatives of Crabtree's Hydrogenation Catalyst." J. Cipot, R. McDonald, and **Mark Stradiotto***. (*Chem. Commun.,* **2005**, 4932-4934).

(31*) (**A**) "Exploring the Influence of Ancillary Ligand Charge and Geometry on the Properties of New Coordinatively Unsaturated Cp*(κ^2-*P*,*N*)Ru^+ Complexes: Linkage Isomerism, Double C-H Bond Activation, and Reversible α-H Elimination." M. A. Rankin, R. McDonald, M. J. Ferguson, and **Mark Stradiotto***. (*Organometallics,* **2005**, *24*, 4981-4994).

(30*) (**C**) "Coordinatively Unsaturated Cationic and Zwitterionic Cp*Ru(κ^2-*P*,*N*) Complexes: Ligand Assisted Double Geminal C-H Bond Activation and Reversible α-H Elimination at Ruthenium." M. A. Rankin, R. McDonald, M. J. Ferguson, and **Mark Stradiotto***. (*Angew. Chem. Int. Ed.,* **2005**, *44*, 3603-3606).

(29*) (**A**) "Synthesis and Reactivity of New κ^2-[*P*,*N*]Pt(II) Complexes of Diisopropylphosphino-Substituted 2-Dimethylaminoindene." B. M. Wile, R. McDonald, M. J. Ferguson, and **Mark Stradiotto***. (*Organometallics*, **2005**, *24*, 1959-1965).

(28*) (**A**) "Synthesis and Crystallographic Characterization of New Mn(I) Complexes of Donor-Functionalized Indenes." J. Cipot, D. Wechsler, R. McDonald, M. J. Ferguson, and **Mark Stradiotto***. (*Organometallics*, **2005**, *24*, 1737-1746).

(27*) (**C**) "Structurally Diverse Rh(I) and Mn(I) Complexes Derived from the New Ambidentate Indene Ligand, (1-{^{i}Pr$_2$P(S)}-2-{NMe$_2$})C$_9$H$_6$." D. Wechsler, R. McDonald, M. J. Ferguson, and **Mark Stradiotto***. (*Chem. Commun.*, **2004**, 2446-2447).

(26*) (**A**) "A New Fluorous Soluble Lewis Acidic Borane System." H. Luong, M. E. Eelman, and **Mark Stradiotto***. (*Can. J. Chem*, **2004**, *82*, 533-538).

(25*) (**A**) "The Divergent Isomerization Behavior and Rh(I) Coordination Chemistry of Indenyl Ligands Bearing Either One or Two Pnictogen Donor Fragments." J. Cipot, D. Wechsler, **Mark Stradiotto***, R. McDonald, and M. J. Ferguson. (*Organometallics*, **2003**, *22*, 5185-5192).

(24*) (**C**) "A Catalytically Active, Charge-Neutral Rh(I) Zwitterion Featuring a P,N-Substituted "Naked" Indenide Ligand." **Mark Stradiotto***, J. Cipot, and R. McDonald. (*J. Am. Chem. Soc.*, **2003**, *125*, 5618-5619).

(23) (**A**) "The Synthesis and Structural Characterization of Linear and Macrocyclic Bis(dinitrosyliron) Complexes Supported by Bis(phosphine) Bridging Ligands." L. Li*, N. Reginato, M. Urschey, **Mark Stradiotto**,* and J. D. Liarakos. (*Can. J. Chem*, **2003**, *81*, 468-475).

(22*) (**R**, **I**) "η^1-Indenyl Derivatives of Transition Metal and Main Group Elements: Synthesis, Characterization and Molecular Dynamics." **Mark Stradiotto*** and M. J. McGlinchey*. (*Coord. Chem. Rev.*, **2001**, *219-221*, 311-378).

[21 more pre-2001]

RESEARCH PRESENTATIONS (2001-present)

The **46** research presentations that I have given include invited seminars at academic institutions across North America, as well as invited contributions given at: American Chemical Society National Meetings (2002, 2008, 2010); Canadian Society for Chemistry Conference and Exhibition Meetings (2004, 2008-2011); Pacifichem (2005, 2010); the Gordon Research Conference on Organometallic Chemistry (2011); the Research and Development Division of Boehringer-Ingelheim (Canada) Ltd. (2005, 2008); and the '8th Organic Workshop for Leading Young Canadian Chemists (2006). Locations of recent invited seminars are listed below:

2011 (and scheduled-2012)
University of Toronto
York University
94th Canadian Society for Chemistry Conference and Exhibition
Gordon Conference on Organometallic Chemistry
University of California at Berkeley
University of Ottawa (broadcasted as a "Webinar" in partnership with
Chemical Engineering News and *Sigma-Aldrich Inc.*)
Université de Montreal (scheduled-2012)
University of North Carolina, Chapel Hill (scheduled-2012)
Duke University (scheduled-2012)
Merck & Co., Inc (New Jersey; scheduled-2012)

2010
239th American Chemical Society National Meeting
43rd Silicon Symposium
93th Canadian Society for Chemistry Conference and Exhibition
Laval University
Pacifichem

2009
Duquesne University
St. Mary's University
92nd Canadian Society for Chemistry Conference and Exhibition

CONTRIBUTIONS TO THE TRAINING OF HIGHLY QUALIFIED PERSONNEL

I have continually succeeded in attracting excellent personnel to my group, which commonly consists of a mix of undergraduate, MSc, PhD and postdoctoral researchers (most of whom hold NSERC or other competitive scholarships). I am very proud of the fact that a significant number of the undergraduates that I have supervised have gone on to graduate school in Chemistry, and many have been featured as co-authors on peer-reviewed publications from my group (e.g. in 2010 B. Peters and A. Sappong, CEJ 2010-61 and ANGEW 2010-63). I believe strongly in mentoring the students in my laboratory, and have made a conscious effort to maintain my group at a size whereby I can maintain this mentoring interaction. This has proven to be a very successful approach in terms of developing "highly" qualified personnel. Highlights of my HQP training track-record include:

- Current group: two MSc students, three PhD students, and two PDFs (the second starting Oct 2011)
- Past trainees: 6 PhD, 19 BSc
- PhD graduates: PDFs at Queen's, Cornell, MIT, Yale/Berkeley (**4 of which were awarded NSERC-PDFs**)
- Current PhD Graduate Placement:
    - *B. Wile*, Assistant Professor at Ohio Northern University
    - *D. Wechsler*, Senior Development Scientist at GreenCenter Canada
    - *J. Cipot-Wechsler*, Senior Research Scientist at DuPont Canada
    - *M. Rankin*, Senior Product Development Chemist at 3M Canada (awarded the 2009 Dalhousie University Doctoral Thesis Prize in the Natural Sciences and Engineering)
    - *K. Hesp*, NSERC-PDF (Yale/Berkeley with Prof. J. Ellman)
    - *R. Lundgren*, NSERC PDF (MIT with Prof. G. Fu; awarded the Chemical Institute of Canada 2011 *National Award for Graduate Work in Inorganic Chemistry*; honorable mention for the *2011 NSERC Innovation Challenge Award*).

My group occupies a state-of-the-art organometallic research laboratory, which provides a world-class environment for the training of synthetic chemists. Personnel are involved in the preparation of publications and are encouraged to present their results at group meetings and conferences; over the past few years, my HQP have given **57 oral and poster presentations** at regional, national, and international meetings, including at the *Atlantic Region Organic Symposium*, the *Maritime/Atlantic Inorganic Discussion Weekend*, the *Keith Fagnou Organic Chemistry Symposium*, *CSC Meetings*, the *International Conference on Organometallic Chemistry*, the *Gordon Conference on Organometallic Chemistry*, and the *IUPAC International Symposium on Organometallic Chemistry Directed Towards Organic Synthesis*. As demonstrated by my track-record, personnel trained in my research group are equipped with marketable research and other professional skills and are well-suited to take up high-profile positions in the academic, industrial, and government research sectors.

Graduate Students and Postdoctoral Fellows – Principal Supervisor (Dalhousie University)

Name	Years	Degree	Current activities
Crawford, S.	2011-present	PDF	Postdoctoral Fellow in Stradiotto group (as of Oct 2011)
Wheaton, C.	2011-present	PDF	Killam Postdoctoral Fellow in Stradiotto group
Cook, E.	2011-present	M.Sc.	M.Sc. student (NSERC CGS-M)
MacLean, M.	2011-present	M.Sc.	M.Sc. student (NSERC CGS-M)
Alsabeh, P.	2009-present	Ph.D.	Ph.D. student (NSERC PGS-D)
Lavery, C.	2009-present	Ph.D.	Ph.D. student (NSERC PGS-D)
Tardiff, B.	2008-present	Ph.D.	Ph.D. student (NSERC CGS-D)
Hesp, K.	2006-2010	Ph.D.	NSERC-PDF (Ellman, Berkeley/Yale)
Lundgren, R.	2006-2010	Ph.D.	NSERC-PDF (Fu, MIT)*
Scully, S.	2007-2010	Ph.D.	withdrawn from program; location unknown
Rankin, M.	2003-2008	Ph.D.	NSERC-PDF, MIT (Cummins)**; PDF, Baker, Ottawa; Senior Product Development Chemist, 3M Canada (Brockville, ON)
Wechsler, D.	2003-2007	Ph.D.	(PDF, Queen's University; Jessop); Senior Development Scientist, GreenCentre Canada (Kingston, ON)
Cipot-Wechsler, J.	2002-2006	Ph.D.	(NSERC-PDF, Queen's University; Crudden); Senior Research Scientist, DuPont (Kingston, ON)
Wile, B.	2002-2006	Ph.D.	(PDF, Cornell; Chirik); Assistant Professor Ohio Northern University

** Winner of the 2011 National Award for Graduate Work in Inorganic Chemistry (Chemical Institute of Canada)* and honorable mention for the *2011 NSERC Innovation Challenge Award; **Winner of the 2009 Dalhousie University Doctoral Thesis Award in the Natural Sciences and Engineering*

Undergraduate Students – Principal Supervisor (Dalhousie University)

Name	Year(s)	Current activities
Leonard, S.	2011	Undergraduate, Dalhousie University
Higginbotham, A.	2011	Undergraduate, Dalhousie University
Harding, K.	2011	Undergraduate, Dalhousie University
Bojinescu, I.	2011	Undergraduate, Dalhousie University
Machaalani, E.	2010-2011	Undergraduate, Dalhousie University
Longobardi, L.*,**	2010-2011	Ph.D. program, University of Toronto
Peddle, S.	2010	Undergraduate, Dalhousie University
Wallingford, J.	2010	Undergraduate, Dalhousie University
Borycz, I.	2010	Undergraduate, Dalhousie University
Peters, B.*	2009	Teachers College, StFX University
Shin, K.*	2008	Undergraduate, Dalhousie University
Sappong-Kumankumah, A.*	2008	Undergraduate, Dalhousie University
Burford, R.	2005	Ph.D. program, University of Calgary
MacLean, D.	2005-2006	(completed M.Sc.) Optometry, University of Waterloo
Myers, A.	2004-2005	(completed M.Sc.) Ph.D. Program University of Toronto
Wolstenholme, D.	2003-2004	(completed Ph.D.) Humboldt Fellow, Germany; PDF, UNB
Hodder, M.	2002-2003	(completed B.Sc.) Research Scientist NRC, Halifax

Wechsler, D.	2002-2003	(completed Ph.D.) Senior Development Scientist at GreenCentre Canada (Kingston, ON)
Luong, H.	2002-2003	(completed Ph.D.) Chemistry Instructor, University of Manitoba

**NSERC-USRA awardees; **Winner of the 2010 Warr Scholarship for the top Undergraduate Science Researcher at Dalhousie University*

ADMINISTRATIVE AND RELATED RESPONSIBILITES

Dalhousie University (Department of Chemistry)

Task	Duration
Part-Time Academics Search Committee	2011
Departmental Administrator Search Committee	2010
Glassblower Search Committee	2010
Departmental Graduate Studies Committee (Coordinator and Chair)	2009-2011
Executive Member of the Nuclear Magnetic Resonance Research Resource (NMR3)	2009-present
Undergraduate Studies Committee	2008-2009
NSERC Industrial Research Chair Search Committee	2008-2009
Dalhousie Undergraduate Chemistry Mentoring Program	2007-present
Departmental Health and Safety Committee (Chair) - chosen for 2007-2008 Health and Safety Award, in recognition of "significant laboratory safety accomplishments achieved by the committee"	2006-2009
Executive Member of the Atlantic Region Magnetic Resonance Center (ARMRC)	2005-2009
Killam Chair in Computational Chemistry Search Committee	2005
Physical Chemistry Instructor Search Committee, Department of Chemistry	2003
Graduate Studies Committee, Department of Chemistry - contributed to the development of a new graduate student funding strategy	2001-2006
Advisor to the Dalhousie University Undergraduate Chemistry Society - organized regional chemistry student symposia in October 2002 and September 2005 (approximately 100 participants each)	2001-2006
Teaching Equipment Committee, Department of Chemistry (Chair 2004-2006)	2001-2006

Dalhousie University (Faculty or University Level)

Task	Duration
Member of the PhD Defence Panel for the Faculty of Graduate Studies	2010-2011
Unit Review Committee, Department of Biology	2009-2010
University Chemical Safety Committee Discussion Group	2009-2010
Strategic Vision Committee for the Faculty of Science	2008-2009
Dalhousie University Department of Community Health and Epidemiology Departmental Head Survey/Search Committee	2008-2009
DFA Representative on the Dalhousie Environmental Health & Safety Committee	2007-2009
NSERC-PGS-D Ranking Committee (Chaired the committee in 2006)	2005-2009
MSc in Pharmaceutical Sciences, Internal Review Committee	2007-2008
Sumner Fellowship Ranking Committee	2005-2008
Faculty of Science Conference Travel Grant Committee	2005-2008

National or International

Task	Duration
Treasurer, Inorganic Division of the Chemical Institute of Canada	2008-2011
Pacifichem-2010 Inorganic Chemistry Division Symposium Co-Organizer "Advances in Metal-Mediated Bond Activation" with Kenneth Caulton (USA) and Sanshiro Komiya (Japan)	2008-2010
89th Canadian Society for Chemistry Conference and Exhibition (2006, Halifax NS) - volunteer coordinator and member of scientific program committee - organized "Ligand Design in Transition Metal Chemistry" symposium	2006

MAJOR SCHOLARLY AND PROFESSIONAL ACTIVITIES

Activity	Duration
Member of the Editorial Advisory Board for the ACS Journal "*Organometallics*"	2010-2013
Over the past few years, I have served as a reviewer for numerous journals and funding agencies, including (but not restricted to): **Journals**: Science, Nature, Nature Chemistry, Angewandte Chemie, Journal of the American Chemical Society, Organometallics, Inorganic Chemistry, Chemical Reviews, Advanced Synthesis and Catalysis, Chemistry: A European Journal, Chemistry: An Asian Journal, Chemical Communications, Inorganica Chimica Acta, Journal of Organometallic Chemistry, ChemCatChem, Canadian Journal of Chemistry, Tetrahedron Letters, Tetrahedron, Coordination Chemistry Reviews. **Funding Agencies**: *National Science Foundation*, *Petroleum Research Fund* (American Chemical Society), *Singapore Science & Engineering Research Council* (A*STAR Program), *NSERC-Canada* (Discovery Grants, Strategic Grants, Collaborative Research and Development Grants, and I2I Grants Programs).	
Ph.D. External Examiner for Brock University	2011
Ph.D. External Examiner for the University of British Columbia	2010
Ph.D. External Examiner for the McGill University	2009
Tenure/Promotion Referee (several institutions in Canada and the United States)	2009-2011
American Chemical Society, Member	1998-present
Canadian Society For Chemistry (CSC/CIC), Member (MCIC)	1995-present
Institute for Research in Materials (Dalhousie), Member	2002-present

TEACHING EXPERIENCE AT DALHOUSIE UNIVERSITY

Course	Title	Enrollment
CHEM 5102B-2002	"Advanced Organometallic Chemistry"	5
CHEM 4102B-2002	"Advanced Transition Metal Chemistry"	10
CHEM 4901-2002/3	"Honours Research Project"	3
CHEM 5102B-2003	"Advanced Organometallic Chemistry"	6
CHEM 4102B-2003	"Advanced Transition Metal Chemistry"	9
CHEM 3102B-2003	"Coordination Chemistry of the Transition Metals"	33
CHEM 4901-2003/4	"Honours Research Project"	1
CHEM 6199A-2004	"Advanced Topics in Inorganic Chemistry"	6
CHEM 5102B-2004	"Advanced Organometallic Chemistry"	5
CHEM 4102B-2004	"Advanced Transition Metal Chemistry"	14
CHEM 3102B-2004	"Coordination Chemistry of the Transition Metals"	31
CHEM 5103A-2004	"Spectroscopic and Structural Methods"	5
CHEM 4901-2004/5	"Honours Research Project"	1
CHEM 6199B-2005	"Advanced Topics in Inorganic Chemistry"	1
CHEM 5102B-2005	"Advanced Organometallic Chemistry"	1
CHEM 4102B-2005	"Advanced Transition Metal Chemistry"	11
CHEM 3102B-2005	"Coordination Chemistry of the Transition Metals"	35
CHEM 4901-2005/6	"Honours Research Project"	1
CHEM 5102B-2006	"Advanced Organometallic Chemistry"	6
CHEM 4102B-2006	"Advanced Transition Metal Chemistry"	22
CHEM 1012B-2006	"General Chemistry II"	90
CHEM 6105A-2006	"Inorganic and Organometallic Mechanisms and Syntheses"	6
CHEM 1011A-2006	"General Chemistry I"	310
CHEM 5103B-2007	"Spectroscopic and Structural Methods"	9
CHEM 1011A-2007	"Concepts in Chemistry: Structure and Reactivity"	350
CHEM 5120B-2008	"Advanced Organometallic Chemistry"	9
CHEM 6199B-2008	"Advanced Topics in Inorganic Chemistry"	3
CHEM 1011A-2008	"Concepts in Chemistry: Structure and Reactivity"	320
CHEM 6105A-2008	"Inorganic and Organometallic Mechanisms and Syntheses"	6
CHEM 6105A-2009	"Inorganic and Organometallic Mechanisms and Syntheses"	6
CHEM 4120B-2010	"Advanced Organometallic Chemistry"	20
CHEM 1012B-2010	"Concepts in Chemistry: Energy and Equilibrium"	300
CHEM 1012B-2011	"Concepts in Chemistry: Energy and Equilibrium"	300
	On sabbatical from 01July 2011-30 June 2012	

Founding co-author of the first edition of the "*Concepts in Chemistry*" textbook used in all first-year natural sciences and engineering chemistry classes at Dalhousie University beginning in the fall of 2006.