Roy A. Periana

Curriculum Vitae

Department of Chemistry
The Scripps Research Institute
5353 Parkside Dr. RE-2
Jupiter, FL 33548
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Home pages: http://www.scripps.edu/research/faculty.php?rec_id=60973

EDUCATION:

1981 – 1985	University of California, Berkeley Ph.D. in Organic Chemistry (*summa cum laude*) Thesis: *Mechanism of Oxidative Addition of Cyclopentadienyl-Rhodium Complexes to Carbon-Hydrogen and Carbon-Carbon Bonds.* Advisor: Prof. Robert G. Bergman
1977 - 1979	University of Michigan, Ann Arbor B.S. in Chemistry (*with honors*)

EXPERIENCE:

2007 – Present	Professor of Chemistry and Director of Scripps Energy Laboratories, The Scripps Research Institute, Florida
2005 – Present	Co-Founder and Member of Board of Directors, Qateomix, Inc. Covina, CA
2003 – Present	Faculty Associate, Power Environmental & Energy Research Center, California Institute of Technology
2001 – Present	Visiting Associate, Chemistry and Chemical Engineering, California Institute of Technology (Caltech), Pasadena, CA
2000 – 2007	Professor of Chemistry. University of Southern California, Department of Chemistry and Loker Hydrocarbon Research Institute. Director USC-Caltech-Chevron Consortium on New Catalysis Technology
1994 – 2000	Catalytica Advanced Technologies, Inc. Co-Founder and Vice President of Research
1988 – 1994	Catalytica, Inc. Senior Research Fellow and Project Leader
1985 - 1988	The Monsanto Company, St. Louis, Missouri Research Specialist
1979 - 1981	The Dow Chemical Company Research Chemist

Roy A. Periana

RESEARCH AREAS:

Organic, Inorganic and Organometallic Chemistry: synthesis, reaction mechanisms and homogeneous catalysis with a focus on developing new, low temperature, selective, conversion chemistry of small molecules such as CH_4, O_2, H_2O, CO_2 and N_2.

NOTABLE:

- **2007** Japan Society for the Promotion of Science (JSPS) Fellowship
- Host to visiting Japanese Scholar for 6 months, 2004
- *Topics in Current Chemistry*. Volume Editor: *C-H Activation*, **2005**
- Selected Lecturer to summer school, "Seminaire Hors-Ville en Chimie Inorganique" in Switzerland, September, **2001**
- Publications in *Science* (**1993, 1998, 2003**). Wide coverage in various media: C & E News, Wall Street Journal, New York Times, etc.
- Invited Speaker to **1993, 1997, 1999, 2003, 2005** Gordon Research Conferences
- Chairman of National ACS Inorganic Symposium in **1999**
- Keynote Speaker at the **1998** Bloomberg Conference on Energy
- Keynote Speaker at **1998** Zimmerman Organometallic Workshop
- Founder and Research Director, Catalytica Advanced Technologies, Inc. **1998**
- Appointed as Senior Research Fellow, Catalytica, Inc., **1989**
- Achievement Award, Monsanto Company, **1987** and **1988**
- Graduate Scholastic Honor Society, University of California, Berkeley, **1983 – 1985**
- Φ Λ Y National Honor Society, University of Michigan, Ann Arbor, **1978**
- CRC Freshman Chemistry Award, Grand Rapids Junior College, **1976**

SYNERGISTIC ACTIVITIES:

- Volume Editor: *C-H Activation*. *Topics in Chemistry*, Springer-Velag, **2004**
- Symposium Organizer and Co-Organizer: Pacifichem **2005**, American Chemical Society **2004**, **2003** and **1990**. Gordon Research Conference on Hydrocarbon Resources **2002**
- Served on National Science Foundation Grant Award Panel (**2004, 1999**)
- Reviewed several proposals for National Science Foundation; Petroleum Research Fund; Department of Energy, Basic Energy Sciences; Department of Defense, Army; Global Climate and Energy Project at Stanford University; Israel Science Foundation
- Reviewed for several journals: *Science*, *Nature*, *J. Am. Chem. Soc.*, *Angew. Chem. Int. Ed.*, *Chem. Commun.*, *J. Mol. Cat.*, *J. Org. Chem.*, *Inorg. Chem.*, *Organometallics*, *J. Catal.*, *J. Mol. Catal.*, *Chem. Rev.*

OBJECTIVES: Facilitate the Development and Commercialization of New Technologies in the Power and Petrochemical Industry through Research and Teaching.

Roy A. Periana

Publications

1. "Single-Site Coordination Catalysts for Small Molecule Conversion." *Comments on Inorganic Chemistry*, in preparation, **Invited Submission**

2. "Designing the Next Generation of Hydroxylation Catalysts for Hydrocarbons." *Account of Chemical Research*, in preparation. **Invited Submission**

3. "Bis-Ethylene Bis-Acetylacetonato Complexes of Divalent Osmium." Mironov, O. A.; Periana, R. A. in preparation.

4. Non-planar Tetradentate Diamine-Bis(phenolate) Ligated Rhodium(III) Complexes: Synthesis and Structures." Liu, X. Y.; Periana, R. A.; *Organometallics*, **2007,** submitted .

5. "Synthesis, Characterization, and CH Activation Reactions of Novel Organometallic O-donor Ligated Rh(III) Complexes." Tenn, W. J. III, Conley, B. J.; Periana, R. A. in preparation.

6. "Mechanistic Analysis of Iridium Heteroatom C-H Activation: Evidence for an Internal Electrophilic Substitution Mechanism" Gonzales, J.; Oxgaard, J.; Periana, R. A.; Goddard, W. A. III. *Organometallics*, **2007**, *26*, 1565

7. "Methane Activation with Rhenium Catalysts I: Bidentate Oxygenated Ligands" Gonzales, J.; Oxgaard, J.; Periana, R. A.; Goddard, W. A. III *Organometallics*, **2007**, *26*, 1505.

8. "Mechanism of Anti-Markovnikov Olefin Hydroarylation Catalyzed by Homogeneous O-Donor Ir(III) Complexes." Oxgaard, J.; Tenn W. J. III; O.; Nielsen, R. J.; Goddard, W. A. III Periana, R. A. *J. Am. Chem. Soc*, **2007**, Submitted

9. "Mechanism of Hg(II) catalyzed oxidation of methane to methanol via methane ch activation." Nakamura, S.; Taube, Gonzales, J. M.; D. Periana, R. A. *J. Am. Chem. Soc*, **2007**, Submitted

10. "CH Activation and Oxidation of Methane to Methanol with a Cyclometallated (NNC)Ir(III) Complex". Young, K. J. H; Periana, R. A. *J. Am. Chem. Soc*, **2007,** submitted

11. "Oxidative Functionalization of a Metal Carbon bond by a 3+2 Mechanism" Conley, B; Tenn, W. J.; Periana, R. A. *J. Am. Chem. Soc*, **2007**, Submitted

12. "Stoichiometric Oxyfunctionalization of a Cyclometalated Ir(III) 6- Phenyl-2,2'-Bipyridine Alkyl Complex and CH Activation Studies" Young, K. J. H; Mironov, O.A.; Periana, R. A. *Organometallics*, **2007**, *26*, 2137

13. “Mechanism of Pt(II) Bipyrimidine Catalyzed Oxidation of Methane to Methanol via CH Activation.” Mironov, O.A.; Ziatdinov, V. R.; Ortmann, D. A.; Periana, R. A. *J. Am. Chem. Soc.*, **2006**, Submitted

14. “Heterolytic CH Activation and Catalysis by an O-donor Iridium-Hydroxo Complex.” Tenn, W. J.; Young, K. J. H; Oxgaard, J.; Nielsen, R. J.; *Organometallics*, **2006**, *25*, 5173

15. “Heterolytic C-H Activation with a Cyclometalated Pt(II) 6-Phenyl-4,4’-di-tert-butyl,-2,2’-Bipyridine Complex.” Young, K. J. H; Meier, S. K.; Gonzales, J. M.; Goddard III, W. A.; Periana, R. A. *Organometallics* **2006,** *25*, 4734

16. “Functionalization of Metal Carbon Bond by Oxygen Atom Transfer” Conley, B, L.; Ganesh, S. K.; Gonzales, J. M; Tenn, W. J,; Young, K. J. H.; Oxgaard, J.; Goddard III, W. A.; Periana, R. A. *J. Am. Chem. Soc*, **2006**, *128*, 9018

17. "Carboxylic Solvents and O-donor Ligand Effects on CH activation by Pt(II)" Ziatdinov, V. R.; Oxgaard, J.; Mironov, O. A.; Goddard III, W. A.; Periana, R. A. *J. Am. Chem. Soc.*, **2006**, *128*, 7404

18. “Design and study of homogeneous catalysts for the selective, low temperature oxidation of hydrocarbons.” Conley, B. L.; Tenn, W. J.; Young, K. J. H.; Ganesh, S. K.; Meier, S. K.; Ziatdinov, V. R.; Mironov, O; Oxgaard, J; Gonzales, J.; Goddard, W. A.; Periana, R. A. *J. of Mol. Catal. A: Chemical* **2006**, *251*, 8

19. “Mechanistic Investigation of Iridium-Catalyzed Hydrovinylation of Olefins.” Oxgaard, Jonas; Bhalla, Gaurav; Goddard, William A., III.; Periana, Roy A. *Organometallics* **2006**, *25*, 1618

20. “CH Activation with an O-Donor Iridium Methoxo Complex.” Tenn, W. J,; Young, K. J. H.; Oxgaard, J.; Goddard III, W. A.; Periana, R. A. *J. Am. Chem. Soc*., **2005** *127*, 14172

21. “Hydrovinylation of olefins catalyzed by an Iridium Complex via C-H Activation.” Bhalla, G.; Oxgaard, J.; Goddard III, W. A.; Periana, R. A. *Organometallics*, **2005,** *24*, 5499

22. “Synthesis, Structure and Reactivity of O-Donor Ir(III) Complexes: C-H Activation Studies with Benzene.” Bhalla, G.; Liu, X. Y.; Oxgaard, J.; Goddard III, W. A.; Periana, R. A. *J. Am. Chem. Soc.*, **2005**, *127*, 11372.

23. “Anti-Markovnikov Hydroarylation of Unactivated Olefins Catalyzed by a bis-Tropolonato Iridium (III) Organometallic Complex.” Bhalla, G.; Oxgaard, j.; Goddard III, W. A.; Periana, R. A. *Organometallics*, **2005,** *24*, 3229

24. “Homogeneous, catalytic, oxidative coupling of methane to acetic acid in one step.” Periana, R. A; Mironov, O. *Topics in Catalysis*, **2005**, *32*, 169

25. “C-H Activation of Alkanes and Arenes Catalyzed by an O-donor, Bis-Tropolonato Iridium (III) Complex.” Bhalla, G.; Periana, R. A. *Angew. Chem. Int. Ed.*, **2004,** *44*, 1540.

26. Review chapter entitled “Transition-Metal Catalyzed Oxidation of Alkanes.” in Handbook of C-H Activation, Wiley-VCH, G.; Tenn, W. J.; Young, K. J. H.; Liu, X.; Mironov, O.; Jones, CJ.; Ziatdinov, V. R , **2004**

27. “Mechanistic Analysis of Hydroarylation Catalysts.” Oxgaard, J.; Periana, R. A.; Goddard III, W. A. *J. Am. Chem. Soc.*, **2004**¸*126*, 11658**.**

28. “Selective Oxidation of Methane to Methanol Catalyzed, with C-H Activation, by Homogeneous, Cationic Gold.” Jones, CJ; Taube, D.; Ziatdinov, V. R.; Periana,* R. A.; Nielsen, R. J.; Oxgaard, J.; Goddard, W. A. *Angew Chem. Int. Ed.*, **2004,** *126*, 1165.

29. “Perspectives on Some Challenges and Approaches for Developing the Next Generation of Selective, Low Temperature, Oxidation Catalysts for Alkane Hydroxylation Based on the C-H Activation Reaction.” G.; Tenn, W. J.; Young, K. J. H.; Liu, X.; Mironov, O.; Jones, CJ.; Ziatdinov, V. R.; *J. Mol. Cat.*, **2004**, *22*, 7

30. **“**Alkane C-H Bond Activation by O-Donor Ir Complexes. Activation and Functionalization of C-H bonds.” Wong-Foy, A. G.; Bhalla, G.; Liu, X. Y.; Periana, R. A. Jones, CJ. *American Chemical Society Symposium Series* 885, **2004**,105, Ed. Goldberg K. I.; Goldman A. S.

31. “Selective Oxidation of CH_4 to CH_3OH by the Catalytica (bpym)$PtCl_2$ Catalyst: a Theoretical Study.” Xu, X.; Fua, G.; Goddard III, W. A.; Periana, R. A. *Studies in Surface Science and Catalysis*, **2004**,*147*, 499

32. “Synthesis and Structural Characterization of Novel Organometallic, Rh(III), Bis(acetylacetonate) Complexes.” Liu, X. Y.; Tenn III, W. J.; Bhalla, G.; Periana, R. A. *Organometallics* **2004**, *23*, 3584

33. “Mechanism of Homogeneous Ir(III) Catalyzed Regioselective Arylation of Olefins.” Periana, R. A.; Bhalla; G. A.; Oxgaard, J.; Muller, R. P.; Goddard, W. A. *J. Am. Chem. Soc.* **2004**, *126*, 352

34. “Structure, Bonding, and Stability of a Platinum(II) Catalyst: A Computational Study.” Xu, X.; Kua, J.; Periana, R. A.; Goddard, W. A., III. *Organometallics*, **2003**, *22*, 2057

35. “Alkane C-H Activation and Catalysis by an O-Donor Ligated Iridium Complex.” Wong-Foy, A. G.; Bhalla, G.; Liu, X. Y.; Periana, R. A.. *J. Am. Chem. Soc.*, **2003**, *125*, 14292

36. “Catalytic, Oxidative Condensation of CH_4 to CH_3COOH in One Step via CH Activation.” Periana, R. A.; Mironov, O.; Taube, D.; Bhalla, G.; Jones, CJ. *Science*, **2003**, *301*, 814

37. “Novel bis-acac-O,O-Ir(III) Catalyst for Anti-Markovnikov, Hydroarylation of Olefins Operates by Arene CH Activation.” Periana, R. A.; Liu, X. Y.; Bhalla, G. *Chem. Commun.*,

2002, *24*, 3000

38. “Regioselective Hydrophenylation of Olefins Catalyzed by an Ir(III) Complex.” Periana, R. A.; Matsumoto, T.; Taube, D.; Yoshida, H. *J. Mol. Catal. A.,* **2002**, *180,* 1

39. “High Yield Conversion of Methane to Methyl Bisulfate Catalyzed by Iodine Cations.” Periana, R. A.; Mirinov, O.; Taube, D. J.; Gamble, S. *Chem. Commun.,* **2002,** *20,* 2376

40. “Stability and Thermodynamics of the $PtCl_2$ Type Catalyst for Activating Methane to Methanol: A Computational Study.” Kua, J.; Xu, X.; Periana, R. A.; Goddard, W. A. III. *Organometallics,* **2002**, *21,* 511

41. “Synthesis of Styrene by Rhodium-Catalyzed Oxidative Arylation of Ethylene with Benzene.” Periana, R. A.; Matsumoto, T.; Taube, D.; Yoshida, H. *J. Catal.,* **2002**, *206,* 272

42. “Catalysis Research of Relevance to Carbon Management: Progress, Challenges, and Opportunities.” Periana, R. A. *et. al.*, (Meeting Attendees) *Chem. Rev.,* **2001**, *101,* 953

43. “Anti-Markovnikov Olefin Arylation Catalyzed by an Iridium Complex.” Matsumoto, T.; Taube, D. J.; Periana, R. A.; Taube, H.; Yoshida, H. *J. Am. Chem. Soc.*, **2000**, *122,* 7414

12 articles in refereed journals based on research prior to the University of Southern California

44. “Platinum Catalysts for the High-Yield Oxidation of Methane to a Methanol Derivative.” Periana, R. A.; Taube, D. J.; Gamble, S.; Taube, H.; Fujii, H. *Science*, **1998**, *280,* 560

45. “A Novel, High-Yield System for The Oxidation of Methane to Methanol.” Periana, R. A. *Adv. Chem. Ser. Electron Transfer Reactions.*, **1997**, *253*, 61

46. “Computational study of the highly efficient conversion of methane to methanol with mercury(II) catalysts.” Horsley, J. A.; Vanderveken, D. J.; Periana, R. A. *Catalysis Today,* **1995**, *23*, 33

47. "A Mercury-Catalyzed, High-Yield System for the Oxidation of Methane to Methanol." Periana, R. A.; Taube, D. J.; Evitt, E. R.; Loffler, D. G.; Wentrcek, P. R.; Voss, G.; Masuda, T. *Science*, **1993**, *259*, 340

48. "A Convenient Asymmetric Synthesis of the Unnatural Amino Acid 2,6-Dimethyl-L-Tyrosine." Dygos, J. H.; Yonan, E. E.; Scaros, M. G.; Goodmonson, O. J.; Getman, D. P.; Periana, R. A.; Beck, G. R.; *Synthesis*, **1992**, 741

49. "A Convenient Method for Sealing and Opening NMR Tubes Under Air-Free Conditions." Bergman, R. G.; Buchanan, J. M.; McGhee, W. D.; Periana, R. A.; Seidler, P. F.; Trost, M.

K.; Wenzel, T. T. *ACS Symp. Ser.*, 357 (Exp. Organomet. Chem.), 227, **1987**

50. "C-C Activation of Organic Small Ring Compounds by the Rearrangement of Cycloalkylhydridorhodium Complexes to Rhodacyclobutanes. Synthesis of Metallacyclobutanes, including one with a Tertiary M-C Bond, by Nucleophilic Addition to π-Allyl Complexes." Periana, R. A.; Bergman, R. G. *J. Am. Chem. Soc.*, **1986**, *108*, 7346

51. "Isomerization of the Hydridoalkylrhodium Complexes Formed on Oxidative Addition of Rhodium to Alkane C-H Bonds. Evidence for the Intermediacy of η^2-Alkane Complexes." Periana, R. A.; Bergman, R. G. *J. Am. Chem. Soc.*, **1986**, *108*, 7332

52. "Rapid Intramolecular Rearrangement of a Hydrido(cyclopropyl)Rhodium Complex to a Rhodacyclobutane. Independent Synthesis of a Metallacycle by Addition of Hydride to the Central Carbon of a Cationic Rhodium π-Allyl Complex." Periana, R. A.; Bergman, R. G. *J. Am. Chem. Soc.*, **1984**, *3*, 7272

53. "Oxidative Addition of Rhodium to Alkane C-H Bonds: Enhancement in Selectivity and Alkyl Group Functionalization." Periana, R A.; Bergman, R. G. *Organometallics*, **1984**, *3*, 508

54. "Oxidative Addition of Soluble Iridium and Rhodium Complexes to Carbon-hydrogen Bonds in Methane and Higher Alkanes." Janowicz, A. H.; Periana, R. A.; Buchanan, J. M.; Kovac, C. A.; Stryker, J. M.; Wax, M. J.; Bergman, R.G. *Pure and Appl. Chem.*, **1984**, *56*, 13

55. "Does Substrate Rather than Protein Provide the Catalyst for a-Proton Abstraction in Aldolase?" Periana, R. A.; Motur-Degrood, R.; Chiang, Y.; Hupe, D. J. *J. Am. Chem. Soc.*, **1980**, *102*, 3923

Magazine Coverage

These are technical magazines that report on significant results directed at a large, general audience

1. Old Gas, New Gas. Methane Made and Taken Apart by Microbes, in the Earth, by People by Roald Hoffmann. *American Scientist*, 2006

2. "Methanol: The New Hydrogen. "Advances in methanol synthesis, coupled with improved fuel cell technology, could make it a viable alternative to gasoline." Technology Review, **2006** (http://www.technologyreview.com/BizTech-Energy/wtr_16629,296,p1.html)

3. *Chemical & Engineering News* covered our JACS paper, "Anti-Markovnikov Olefin Arylation Catalyzed by an Iridium Complex." July 2000, page 11. Title of article: "Alkylbenzenes Toe the Line in New Reaction."

4. My University of Southern California research group and I were featured in the *C&E News* "Celebrating the American Chemical Society at 125, New Voices in Chemistry" issue, March 2001, page 287. Title of article "Cooler Chemistry for the 21st Century."

5. Our University of Southern California work was covered in the MIT's *Magazine of Innovation*, Special Issue on Energy in February 2002, page 69. Title of article "Hitting the Natural-Gas Jack-Pot."

6. *Chemical & Engineering News* covered our *Chem. Commun.* paper under the "Concentrates" section entitled "Iodine Cations Oxidize CH_4." October, 2002, page 41.

7. *Chemical & Engineering News* and several other magazines covered the *Science* **2003** paper with an article entitled "Methane to Acetic Acid in One Step" under the Headlines section on August 11, 2003, Volume 81, Number 32.

Peer-reviewed Conference Proceedings

These are camera-ready peer-reviewed articles that are published in book form

1. "A Novel, High Yield System for the Oxidation of Methane to Methanol." *Studies in Surface Science and Catalysis*, **1994**, *81*, Natural Gas Conversion II, Proceedings of the Third Natural Gas Conversion Symposium, Sydney, July 4, **1993**, 28, Elsevier.

2. "High-yield, Low-Temperature Oxidation of Methane to Methanol." Periana, R. A.; Taube, D. J.; Gamble, S.; Taube, H.; Fuji, H. *NATO ASI Ser., Ser.* 3 (1998), 44 (Catalytic Activation and Functionalization of Light Alkanes), 297.

3. "A Computational Study of the Highly Efficient Conversion of Methane to Methanol with Mercury (II) Catalysts." Periana, R. A. TOCAT II, **1994**, 256.

Roy A. Periana

Invited Conference Presentations and Lectures

*46 Invited lectures and presentations based on research carried out **at** the University of Southern California*

1. Univesity of Stuttgart, June 2007

2. Max Planck Institut fur Kohlenforschung, June, 2007

3. ETH, Zurich, June 2007

4. Three week lecture tour in Japan as a **Japan Society for the Promotion of Science** (JSPS) Fellow. March, 2007. **Osaka University, University of Tokyo, Kyoto University, Nagoya University, Tokyo Institute of Technology**.

5. Key Note Speaker at **Western Energy Institute,** Operations Conference on Renewable Energy, Newport, CA February 15, 2007

6. "Design and Study of New Coordination Complexes for the Selective Oxidation of Hydrocarbons based on the CH Activation Reaction." ***American Chemical Society National Meeting***, San Francisco, September 2006

7. Invited Sessional Lecturer at the **XXIInd International Conference on Organometallic Chemistry** in Zaragoza, Spain, July 23 - 28, 2006

8. Invited speaker at the Symposium on "Ligand Design in Transition Metal Chemistry" at the **89th Canadian Chemistry Conference and Exhibition**, May 27–31, 2006, Halifax, Nova Scotia, Canada

9. "New Organometallic Oxidation Catalysts Based on the CH Activation Reaction" **California State University Northridge**, 2006

10. "Design and Study of Homogenous Catalysts for the Selective Oxidation of Hydrocarbons" **The University of Texas at Austin**. 2006

11. **Pacifichem 2005,** Inorganic Chemistry. Symposium Organizer and Speaker, Honolulu, HI, December 2005

12. "Design and Study of Coordination Catalysts for the Selective Oxidation of Hydrocarbons via the CH Activation Reaction." ***Gordon Research Conference, Inorganic Chemistry,*** 2005

13. "9th International Symposium Activation of Dioxygen and Homogeneous Catalytic oxidation." **University of Cologne, Germany, Plenary Lecture**, July 25, 2005

14. "Homogeneous Transition Metal Complexes for Selective Hydrocarbon Conversion." ***American Chemical Society National Meeting***, Philadelphia, PA, 2004

15. "Chemistry and Mechanism of New Alkane CH Activation and Functionalization Catalysts." ***University of California, Berkeley***, 2004

16. "Chemistry and Mechanism of Reaction of New O-Donor Complexes of Late Transition Metals." ***University of Michigan,*** Ann Arbor, 2004

17. "Chemistry and Mechanism of New Alkane CH Activation Catalysts." ***Michigan State University,*** East Lansing, 2004

18. "Green Catalysts for the 21st Century." ***National Science Foundation Workshop on Green Chemistry***, Arlington, Virginia, 2004

19. "Homogeneous Transition Metal Complexes for Selective Hydrocarbon Conversion." **Chairman of Symposium, Speaker** on "Advances in Catalysis of the Selective Oxidation of Hydrocarbons." ***American Chemical Society National Meeting***, Anaheim, CA, 2004

20. "New Catalysts for the Direct, Low Temperature, Selective Conversion of Unactivated Hydrocarbons to Useful Products." ***ExxonMobil Chemicals,*** Baytown, Texas, 2004

21. "Chemistry and Mechanism of the Palladium Catalyzed Oxidative Condensation of Methane to Acetic Acid." ***Celanese Chemicals***, Baytown, Texas, 2004

22. "New Catalysts for the Direct, Low Temperature, Selective Conversion of Unactivated Hydrocarbons to Useful Products." ***BP Chemicals,*** Naperville, IL, 2004

23. "Alkane Activation: Key to Natural Gas Conversion to Liquids?" **Opening Speaker** at "Fuels for 21st Century" Symposium, ***American Chemical Society National Meeting,*** New York, 2003

24. "CH Activation and Catalytic Conversion of Alkanes and Arenes Based on O-Donor Metal Complexes." Inorganic Chemistry Symposium, ***American Chemical Society National Meeting,*** New York, 2003

25. "Chemistry and Mechanism of New Alkane CH Activation Catalysts" ***Gordon Research Conference, Organometallic Chemistry,*** 2003

26. "Alkane Activation: Key to Natural Gas Conversion to Liquids?" **Session Chair/Speaker at *Gordon Research Conference on Hydrocarbon Resources***, 2003

27. "Chemistry and Mechanism of New Alkane CH Activation and Functionalization Catalysts." ***California Institute of Technology***, Pasadena, CA, 2003

28. "Chemistry and Mechanism of New Alkane CH Activation Catalysts" ***Stanford University,*** Stanford, CA, 2003

29. "Challenges and Strategies to Developing New Homogeneous Catalyts for Hydrocarbon Functionalizations via CH Activation." ***The Scripps Research Institute***, San Diego, CA, 2003

30. "CH Activation and Catalytic Conversion of Alkanes and Arenes Based on O-Donor Metal Complexes."
University of North Carolina, Chapel Hill, NC, 2003

31. "Challenges and Strategies to Developing New Homogeneous Catalysts for Hydrocarbon Functionalizations via CH Activation."
Texas A&M University, College Station, TX, 2003

32. "Challenges and Strategies to Developing New Homogeneous Catalysts for Hydrocarbon Functionalizations via CH Activation."
Columbia University, New York, NY, 2003

33. "Chemistry and Mechanism of New Alkane CH Activation Catalysts"
Massachusetts Institute of Technology, Cambridge, MA, 2003

34. "Chemistry and Mechanism of New Alkane CH Activation Catalysts"
University of Wisconsin, Madison, WI, 2003

35. "Chemistry and Mechanism of New Alkane CH Activation and Functionalization Catalysts"
University of Chicago, Chicago, IL, 2003

36. "Challenges and Strategies to Developing New Homogeneous Catalysts for Hydrocarbon Functionalizations via CH Activation."
Yale University, New Haven, CT, 2003

37. "CH Activation and Catalytic Conversion of Alkanes and Arenes Based on O-Donor Metal Complexes."
Princeton University, Princeton, NJ, 2003

38. "Chemistry and Mechanism of New Alkane CH Activation Catalysts"
University of California, San Diego, 2003

39. "Chemistry and Mechanism of New Alkane CH Activation Catalysts"
University of Washington, Seattle, WA, 2003

40. "Homogeneous Transition Metal Complexes for Selective Hydrocarbon Conversion."
Colorado State University, Fort Collins, CO, 2003

41. "Chemistry and Mechanism of New Alkane CH Activation Catalysts"
North Carolina State University, NC, 2003

42. "Selective Methane Oxidation via CH Activation Catalysts."
ChevronTexaco Energy and Technology Company, Richmond, CA, 2002

43. "Homogeneous Transition Metal Complexes for Selective Hydrocarbon Conversion."
Louisiana State University, 2002

44. "Regiospecific Hydro Phenylation of Olefins Catalyzed by Ir(III) Complex."
University of California, Berkeley, 2002

45. "Experimental and Theoretical Study of a High-Yield, Methane Hydroxylation Catalyst."
University of California, Santa Barbara, 2002

46. "Mechanism of Oxidation of Methane to Methanol Catalyzed by Dichloro(h-2-{2,2'-bipyrimidyl})platinum(II)." CH Activation Symposium Speaker, ***American Chemical Society National Meeting***, Florida, 2002

47. "Mechanism of Oxidation of Methane to Methanol Catalyzed by Dichloro(h-2-{2,2'-bipyrimidyl})platinum(II)." ***Loker Hydrocarbon Research Institute, University of Southern California,*** Los Angeles

48. "Alkane Activation: Key to Natural Gas Conversion to Liquids?" ***Keynote Speaker in Hydrocarbon Conversion Symposium in Beijing***, China, 2002

49. Invited lecturer to summer school, **"Seminaire Hors-Ville en Chimie Inorganique"** in Switzerland, September 2001. Four lectures to international students and faculty on the topic of "CH Activation"

50. "Next Generation Hydrocarbon Conversion Processes using CH Activation Catalysts." ***Shell Chemicals,*** Houston, Texas, 2001

51. "Regioselective Alkylation of Arenes by Olefins Catalyzed by a Transition Metal Complex." ***University of California, Los Angeles***, 2001

27 Invited lectures and presentations based on research ***prior to*** *University of Southern California*

52. Chairman of Symposium on "Molecular Approaches to CH Activation and Selective Oxidation of Alkanes," Speaker. "Hydrocarbon Chemistry is a Foundation of Modern Civilization."
American Chemical Society National Meeting, Anaheim, CA, 1999

53. "Next Generation Hydrocarbon Conversion Processes using CH Activation Catalysts."
Workshop on Carbon Management, DOE/Los Alamos, Santa Fe, 1999

54. "Mechanism of Oxidation of Methane to Methanol Catalyzed by Dichloro(h-2-{2,2'-bipyrimidyl})platinum(II)."
Gordon Conference, Inorganic Reaction Mechanisms, 1999

55. "Mechanism of Oxidation of Methane to Methanol Catalyzed by Dichloro(h-2-{2,2'-bipyrimidyl})platinum(II)."
International Symposium on Homogeneous Catalysis Conference, Vancouver, Canada, 1998

56. "Selective Methane Oxidation via CH Activation Catalysts."
Stanford University, CA, 1998

57. "Selective Methane Oxidation via CH Activation Catalysts."
Harvard University, *Boston, MA*, 1998

58. "Experimental and Theoretical Study of a High-Yield, Methane Hydroxylation Catalyst."
University of Washington, Seattle, 1998

59. "Hydrocarbon Chemistry is a Foundation of Modern Civilization."
Keynote Speaker at Bloomberg Conference on Energy, 1997

60. "Mechanism of Oxidation of Methane to Methanol Catalyzed by Dichloro(h-2-{2,2'-bipyrimidyl})platinum(II)."
Gordon Organometallic Conference, 1997

61. "Using the CH Activation Reaction to Develop the Next Generation of Hydrocarbon Conversion Catalysts."
Key note Speaker at Zimmerman Organometallic Workshop, 1997

62. "Using the CH Activation Reaction to Develop the Next Generation of Hydrocarbon Conversion Catalysts."
NATO School on CH Activation, Portugal, 1997

63. "Mechanism of Oxidation of Methane to Methanol Catalyzed by Dichloro(h-2-{2,2'-bipyrimidyl})platinum(II)."
University of Wisconsin, Madison, WI, 1995

64. "Life After Transition Metals."
University of California, Berkeley, CA 1994

65. "Using the CH Activation Reaction to Develop the Next Generation of Hydrocarbon Conversion Catalysts."

University of California, Berkeley, Chem. Eng. Dept., 1994

66. "Hg(II) Catalyzed Methane Oxidation Catalyst."
American Chemical Society National Meeting, Symposium on Functionalization of Alkanes by Metal Centers, San Diego, CA, 1994

67. "Hg(II) Catalyzed Methane Oxidation Catalyst."
University of Southern California, Los Angeles, CA, 1994

68. "Next Generation of Hydrocaron Converison Catalysts."
Gordon Conference on Hydrocarbon Resources, Oahu, 1994

69. "Experimental and Theoretical Study of a High-Yield, Methane Hydroxylation Catalyst."
Gordon Organometallic Conference, Rhode Island, July, 1993

70. "Homogeneous Transition Metal Complexes for Selective Hydrocarbon Conversion."
European Catalysis Conference, EUROCAT-1, August, 1993

71. "Selective Hydroxylation of Methane."
GRI Methane Conversion Conference and Workshop, Milan, Italy, 1993

72. "Next Generation of Natural Gas Conversion Chemistry."
World Methane Conference, Sydney, Australia, 1993

73. "Mechanism and Chemistry of Homogeneous Hg(II) Catalyzed Methane CH Activation."
Advances in Catalytic Technologies, Catalytica, Inc. Mountain View, CA, 1992

74. "Mechanism and Chemistry of Homogeneous Hg(II) Catalyzed Methane CH Activation."
University of California, Davis, 1992

75. "Mechanism of Oxidation of Alkyl Arenes."
International Chemical Congress of Pacific Basin, Honolulu, HI, December, 1991

76. "New Route to Artificial Amino Acids."
International Symposium on Homogeneous Catalysis Conference, Lyon, France, 1990

77. "Mechanism of Oxidation of Alkyl Arenes."
California Institute of Technology, November, 1987

78. "New Oxidation Chemistry for Arene Carboxylic Acids."
University of Missouri, St. Louis, MO, 1986

Upcoming Invited Lectures and Conferences

1. **XXIInd International Conference on Organometallic Chemistry**, Zaragoza, Spain, July 2006

2. **Ligand Design in Transition Metal Chemistry**" at the "**89th Canadian Society for Chemistry Conference and Exhibition**." in Halifax, Nova Scotia on May 27-31, 2006

Student Presentations

1. "Novel Ir(III) O-donor Ligated Complexes: Synthesis and Catalytic C-H Activation Chemistry of Ir(III) o-acylphenolate Compounds." Liu, X. Y.; Periana, R. A. ***National American Chemical Society Meeting, Anaheim, CA***, 2004

2. "Catalytic Methane to Methanol Oxidation Employing Gold Complexes." Jones, CJ.; Periana, R. A. ***National American Chemical Society Meeting, Anaheim, CA***, 2004

3. "Why are β-Hydride Elimination Products not Observed in the CH Activation of Alkanes with an O-donor Ligated Ir Complex?" Bhalla, G.; Wong-Foy, A. G.; Liu, X.Y.; Jones, CJ.; Periana, R. A. ***National American Chemical Society Meeting, Anaheim, CA***, 2004

4. "C-H Activation and Functionalization with O-donor Ligated, Late Transition Metal Complexes." Bhalla, G.; Periana, R. A. ***National American Chemical Society Meeting, Anaheim, CA***, 2004

5. "Low-Temperature, Oxidative Condensation of Methane to Acetic Acid in One-Step." Periana, R. A.; Mironov, O. A.; Bhalla, G.; Jones, CJ. ***National American Chemical Society Meeting, Anaheim, CA***, 2004

6. "Amine bis(phenolate)rhodium Complexes: Synthesis, Structures and C-H Activation." Liu, X. Y.; Periana, R. A. ***American Chemical Society National Meeting, New York, NY***, 2003

7. "C-H Activation and Catalytic Conversion of Alkanes and Arenes Based on O-donor Metal Complexes." Periana, R. A.; Wong-Foy, A. G.; Bhalla, G.; Liu, X. Y. ***American Chemical Society National Meeting, New York, NY***, 2003

8. "Alkane CH Activation and Catalysis by O-donor Ligated Ir Complexes." Periana, R. A.; Liu, X. Y.; Wong-Foy, A. G.; Bhalla, G. ***American Chemical Society National Meeting, New York, NY***, 2003

9. "Mechanistic Aspects of the High-Yield, Methane to Methanol Catalytica System." Periana, R. A.; Ortmann, D. A.; Mironov, O. A. ***American Chemical Society National Meeting, Boston, MA***, 2002

10. "Chemistry and Mechanism of a Novel Iridium Catalyst for Regioselective, Anti-Markovnikov, Olefin Arylation." Bhalla, G.; Liu, X. Y.; Periana, R. A. ***American Chemical Society National Meeting, Boston, MA***, 2002

11. “Synthesis and Characterization of Ir(III) Complexes with Tridentate Pyrimidine and Pyrazine Modified Pyridine Ligands and their Application Toward CH- Bond Activation in Acidic Media.” Wong-Foy, A. G.; Periana, R. A.
American Chemical Society National Meeting, Boston, MA, 2002

12. “Experimental and Theoretical Study of a High-Yield, Methane Hydroxylation Catalyst.” Periana, R. A.; Ortmann, D. A.
American Chemical Society National Meeting, Orlando,FL, 2002

Upcoming Student Presentations

1. **“**C-H Activation of Alkanes and Arenes Catalyzed by a bis-Tropolone Ligated Iridium (III) Complex.**”** Bhalla, G.; Periana, R. A.
American Chemical Society National Meeting, San Diego, CA, 2005

2. “Novel C-H Bond Activation with an Iridium Methoxy Complex.” Tenn III, W. J.; Bhalla, G.; Periana, R. A.
American Chemical Society National Meeting, San Diego, CA, 2005

3. “New, Thermally Stable (NNOO)-ligated Ir(III) Complex for C-H Bond Activation.” Liu, X.Y.; Periana, R. A.
American Chemical Society National Meeting, San Diego, CA, 2005

4. “Synthesis and Chemistry of Ru(NNNO) Complexes.” Jones, CJ; Periana, R. A. ***American Chemical Society National Meeting, San Diego, CA***, 2005

5. “Chemistry and Mechanism of Reaction of Arenes with N-Ligated Pt(II) Complexes.” Vadim, Z; Periana, R. A. ***American Chemical Society National Meeting, San Diego, CA***, 2005

Patents

Filed while at USC

1. Periana, Roy A.; Goddard, William A., III. Process for selective oxidation of hydrocarbons using new catalytic systems. PCT Int. Appl. 2006, WO 2006091849

2. Tang, Yongchun; Goddard, William A., III; Periana, Roy. Methods of discovering or developing novel materials and molecules. PCT Int. Appl. 2005. WO 2005120198

3. "Catalytic process for converting methane into acetic acid. Periana, R. A. U.S. Pat. Appl. Publ. **2006**, US 2006167314

4. Provisional Patent on "New Methods for Developing Low Temperature, Selective Oxidation Catalysts for Hydrocarbons-I" 2005

Filed before coming to USC

5. "Intermolecular, Anti-Markovnikov Addition of Arenes to Unactivated Olefins with Non-Lewis Acidic, Homogeneous, Transition Metal Catalysts." US Patent App (2002)

6. "Ligated Platinum Group Metal Catalyst Complex and Improved Process for Catalytically Converting Alkanes to Esters and Derivative Thereof." PCT International, WO 98/50333

7. "Catalytic Process for Converting Lower Alkanes to Esters, Alcohols, and to Hydrocarbons." Roy A. Periana, Douglas J. Taube, Henry Taube, Eric R. Evitt U.S. 5,306,855 (1994)

8. "Process for Converting Lower Alkanes to Esters." Roy A. Periana, Eric R. Evitt, Henry Taube US 5233113 (1993)

9. "Process for the Production of Carbonyls." Roy A. Periana PCT International, WO 9310071 (1993)

10. "Catalytic Process for Converting Hydrocarbonaceous Feeds, Particularly Lower Alkanes to Esters, Alcohols, and Optionally to Hydrocarbons." Roy A. Periana, Douglas J. Taube, Henry Taube, Eric R. Evitt PCT International, WO 9214738 (1992)

11. "Process for the Production of Cyanoacetic Acid." Ray A. Bulls, Jere D. Fellmann, Roy A. Periana PCT International; WO 9212962 A1, 1992 APPLICATION: WO 92US588 (920124) US 645987 (910124)

12. "Oxidation of Tertiary-Alkyl Substituted Aromatics." Roy A. Periana, George F. Schaefer US 5068407, (1991)

13. "Oxidation of Tertiary-Alkyl Substituted Aromatics." Roy A. Periana, George F. Schaefer US 5177049, (1993)

14. “Process for Functionalizing Alkanes.” R. G. Bergman, A. H. Janowicz, R. A. Periana US 4746760 (1988)

15. “Asymmetric Synthesis of Chiral Tyrosine and Phenylalanine Derivatives via Asymmetric Hydrogenation of Acetamidoacrylates.” D. P. Getman, R. A. Periana and D. P. Riley US 4879398 (1989)

16. “Process For Functionalizing Alkanes.” R. G. Bergman, A. H. Janowicz, R. A. Periana US 4511745 (1985)

17. “Improved Process for Making Vicinal Epoxides.” R. A. Periana and J. M. Renga US 4413137 (1983)

18. “Preparation of Carbamates.” R. A. Periana, K. A. Frazier and J. M. Renga US 4554372 (1985)

19. “Preparation of Cyclic Carbonates.” R. A. Periana and J. M. Renga US 4331604 (1982)

20. “Preparation of Cyclic Carbonates.” R. A. Periana and J. M. Renga US 4332729 (1982)