CURRICULUM VITAE

Miguel Ángel Muñoz Hernández

Synopsis

Miguel Muñoz studied chemistry at Mexico's National University *"Universidad Nacional Autónoma de México", UNAM,* from 1987 to1992. Under the supervition of Prof. Raymundo Cea he graduated in 1992 with an udergraduate dissertation project related to a potassium crown complex which incorporates an imido-diphosphine ligand. He continued his Ph.D studies also under the supervision of Prof. Raymundo Cea from 1992 to 1997 developing hypervalent Main Group complexes of As and Sb. During this period of time in 1996, he spent 6 months as a research fellow at the University of Victoria under the supervision of Prof. Stephen Stobart developing new poly(silyl)phosphine ligands for the synthesis of transition metal complexes. After graduation in 1997 with honors, he moved to North Dakota State University (NDSU) as a postdoctoral fellow funded by Prof. David Atwood to work in the synthsis of Al and Ga complexes and their use as catalysts for the ring opening polymerization (ROP) of oxiranes and as Single Source precursors of thin films. In 1998 he moved with the group of Prof. Atwood to the University of Kentucky again as a postdoctal fellow. In 1999 he joined the faculty of the Center for Chemical Research at Autonomous Universtiy of Morelos in Mexico were he currently holds a tenure position as a full Professor. His research interests are in the chemistry of Main Group Complexes as catalysts for the ROP of lactides and lactones, catalysts for Diels-Alder reactions, as Single Source Precursors of thin films of metallic chalcogenides, and Supramolecular Coordination Polymers. He has authored and coauthored 76 publications in indexed journals and supervised six Ph.D., six Master (M.Phil.) and ten BSc students. He currently supervises the research projects of 4 BSc, 1 Master (MPhil), 1 PhD students. He belongs to the Mexican National Research System (SNI, level 3 out of 3).

University employment

1992-1997	Lecturer at National Autonomous University of Mexico (UNAM)

1999 to date:	Profesor-Investigador (Research-Professor) at Autonomous University of the State of Morelos, Center for Chemical Research
Position since 2010:	Profesor-Investigador Titular **C** Definitivo de Tiempo Completo (*equivalent to Full Professor with Tenure, C level of A-C*)
Years of service:	18
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Education

BSc:	Chemistry National Autonoumus University of Mexico, UNAM Mexico 1987-1992
Ph.D:	Chemistry National Autonoumus University of Mexico, UNAM Mexico 1992-1997

Research appointments

March 1996-September 1996:	Research stay at Univesity of Victoria, Canada in the group of Stephen Stobart
April 1997-August 1998:	Postdoctoral position at North Dakota State University (NDSU) at Fargo, North Dakota, USA in the group of David Atwood
August 1998-October 1999:	Postdoctoral position at University of Kentucky (UK) at Lexington, Kentucky, USA in the group of David Atwood

July 2011-January 2012	Visiting Professor at Laboratory of Coordination Chemistry (LCC) at Toulouse, France in the group of Michel Etienne

Awards and Distinctions

1. Ph.D fellowship CONACYT-Mexico 1992-1997.
2. UNAM Fundation award for exceptional students 1996.
3. Alfonso Caso medal for exceptional students 1998.
4. Member of the Scientific and Technological Council of CONACY-Mexico 2000.
5. Member of National System of Researchers (SNI-Mexico) since 1995, Level 3 out of 3 since January 2012 to date.

Publications

77

Citations: More than 1000, *H*-index 18

1. Potassium Tetraphenylimidodiphosphinate Complex of 1,4,7,10,13,16-Hexaoxacyclooctadecane. An Inorganic (Carbon-Free) Chelate Ring, R. Cea-Olivares, M. A. Muñoz, *Monatshefte fur Chemie*, **124**, 471-476, 1993, DOI: 10.1007/BF00819515.
2. On the 5-thia-(substituted)-1-oxa-4,6-dithia-5-stibocanes. Synthesis and characterization of $O(CH_2CH_2S)_2SbS_2P(OC_2H_5)_2$ and Crystal and Molecular Structure of $O(CH_2CH_2S)2Sb\text{-}SCH_2CH_2OCH_2CH_2S\text{-}Sb(SCH_2CH_2)_2O$, A Compound with two Different Eight-Membered Ring Conformations, Raymundo Cea-Olivares, Miguel-Angel Muñoz-Hernández, Simón Hernández-Ortega, Cristian Silvestru, *Inorg. Chim. Acta*, **236**, 31-36, 1995, DOI: 10.1016/0020-1693(95)04602-6.
3. Synthesis and Characterization of Oxa and Thia Metallocanes Substituited with Phosphorodithioate Ligands and Crystal and Molecular Structure of 1, 3, 6-trithia-2-Arsocane Dimethylphosphorodithioate, Miguel-Angel Muñoz-Hernández, Raymundo Cea-Olivares, Simón Hernández Ortega, *Inorg. Chim. Acta*, **253**, 31-37, 1996, DOI: 10.1016/S0020-1693(96)05106-7.

4. The Relationship between Transannular Secondary Bonding Strength and Conformation in Diphenyldithiophosphinate Stibocanes $X(CH_2CH_2S)_2SbS_2PPh_2$ (X = O, S), Miguel-Angel Muñoz-Hernández, Raymundo Cea-Olivares, Simón Hernández-Ortega, *Zeitschrift für Anorganische und Allgemeine Chemie*, **622**, 1392-1398, 1996, DOI: 10.1002/zaac.19966220819.
5. Conformational Trends in Arsocane Dithiophosphinates $X(CH_2CH_2S)_2AsS_2PR_2$ (X = O or S; R = Me, Et or Ph), Miguel-Angel Muñoz-Hernández, Raymundo Cea-Olivares, Georgina Espinoza-Pérez, Simón Hernández-Ortega, *J. Chem. Soc., Dalton Trans.*, 4135-4141, 1996, DOI: 10.1039/DT9960004135.
6. The Conformational Relationships in Group 14 and 15 Oxadithia- and Trithia-Metallocanes, Raymundo Cea Olivares, Verónica García-Montalvo, Miguel-Angel Muñoz-Hernández, Omar Jiménez-Sandoval, Patricia García y García, Marcela López-Cardoso, *Main Group Chemistry News*, **4**, 20-27, 1996.
7. Conformational Trends and Intermolecular Associations in Dialkyldithiophosphinate Stibocanes $X(CH_2CH_2S)_2SbS_2PR_2$ (X = O, S; R = Me, Et), Miguel-Angel Muñoz-Hernández, Raymundo Cea-Olivares, Rubén Alfredo-Toscano, Simón Hernández-Ortega, *Zeitschrift fur Anorganische und Allgemeine Chemie*, **623**, 642-648, 1997, DOI: 10.1002/zaac.199762301102.
8. New Precursors to Group 13 Nitrides, Michael S. Hill, Jolin Jeiger, Miguel-Angel Muñoz-Hernández, Drew Rhutherford, Amy Singer, David A. Atwood, *Phosphorous, Sulfur and Silicon*, **124**, 183-192, 1997, DOI: 10.1080/10426509708545623.
9. Synthesis and Reactions of Tetrazole-Group 13 Complexes, Miguel-Angel Muñoz-Hernández, Michael S. Hill, D. A. Atwood, *Polyhedron*, **17**, 2237-2242, 1998, DOI: 10.1016/S0277-5387(98)00057-6.
10. Inorganic Rings with Group 13 Organometallics and Iminodiphosphinechalcogenides, Miguel-Angel Muñoz-Hernández, Amy Singer, David Atwood, Raymundo Cea-Olivares, *J. Organomet. Chem.*, **571**, 15-19, 1998, DOI: 10.1016/S0022-328X(98)00847-X.
11. Examination of Dibenzyl Aluminum and Gallium Azides as Potential Precursors to AlN and GaN, Miguel-Angel Muñoz-Hernández, Drew Rutherford, Heli Tianen,

David Atwood, *J. Organomet. Chem.*, **582**, 103-107, 1999, DOI: 10.1016/S0022-328X(98)01192-9.

12. Six-coordinate Aluminum Cations: Synthesis, Characterization and Catalysis, Jolin A. Jegier, Miguel-Angel Muñoz-Hernández, Biswajit Sannigrahi, David A. Atwood, *J. Chem. Soc., Dalton Trans.*, 2583-2588, 1999, DOI: 10.1039/A902740H.
13. Five-coordinate, Solvent-Free Aluminum Cations, Miguel-Angel Muñoz-Hernández, Biswajit Sannigrahi, David A. Atwood, *J. Am. Chem. Soc.*, **121**, 6747-6748, 1999, DOI: 10.1021/ja990376g.
14. Bimetallic Aluminum and Gallium Chelates with N_2O_2 Ligands, Michael A. Van Aelstyn, Timothy S. Keizer, David L. Klopotek, Shengming Liu, Miguel-Angel Muñoz-Hernández, P. Wei, David A. Atwood, *Organometallics*, **19**, 1796-1801, 2000, DOI: 10.1021/om990829q.
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18. Tetrametallic Group 13 "Mitsubishi" Molecules, Miguel-Angel Muñoz-Hernández, Pingrong Wei, Shengming Liu, David A. Atwood, *Coord. Chem. Rev.*, **210**, 1-10, 2000, DOI: 10.1016/S0010-8545(00)00314-3.
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21. Reactivity and Derivatization of Five-Coordinate, Chelated Aluminum, Miguel-Angel Muñoz-Hernández, Timothy S. Keizer, Pingrong Wei, Sean Parkin, David A. Atwood, *Inorg. Chem.*, **40**, 6782-6787, 2001, DOI: 10.1021/ic010759r.
22. Six-Coordinate Aluminum Cations: Characterization, Catalysis, and Theory, Miguel-Angel Muñoz-Hernández, Michael L. McKee, Timothy S. Keizer, Burl Yearwood, David A. Atwood, *J. Chem. Soc., Dalton Trans.*, 410-414, 2002, DOI: 10.1039/B106003C.
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31. Cationic-Iridium complexes with chiral dithioether ligands: synthesis, characterization and reactivity under catalytic hydrogenation conditions, L. Flores-Santos, E. Martin-Arrieta, A. Aghmiz, M. Diéguez, C. Claver, A. Masdeu-Bultó, M. A. Muñoz-Hernández, *Eur. J. Inorg. Chem.*, 2315-2323, 2005, DOI: 10.1002/ejic.200400828.
32. Synthesis of New 1,3-Oxaphosphorinanium Salts. Stereochemistry of Hydroxide-Induced Displacement of Methoxide Ion, S. López-Cortina, D. I. Basiulis, K. L. Marsi, M. A. Muñoz-Hernández, M. Ordoñez, M. Fernández-Zertuche, *J. Org. Chem.*, **70**, 7473-7478, 2005, DOI: 10.1021/jo050901w.
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39. Indazolato Derivatives of B, Al and Ga: Characterization and Solvent-Dependent Regioisomeric Structures Through π-π Interactions in Solid State, S. A. Cortes-Llamas, J. M. Hernández-Pérez; M. Hô, M.-Á. Muñoz-Hernández, *Organometallics*, **25**, 588-595, 2006, DOI: 10.1021/om0506421.
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41. Organogallium Complexes Incorporating Tridentate Thioetherbiphenolate Ligands 2,2'-thiobis(2,4-di-ter-butylphenolate), Stdiol and 2,2'-thiobis(2,4-dimethylphenolate), Smdiol, Patricia de la Cruz-Burelo, Virginia Montiel-Palma, Miguel-Ángel Muñoz-Hernández, *Main Group Chem.*, **5**, 61-77, 2006; DOI: 10.1080/10241220600903514.
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D. Jones, Juventino J. García, *Organometallics*, **26**, 1712-1720, 2007, DOI: 10.1021/om061037g.

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44. Agostic Si–H bond coordination assists C–H bond activation at ruthenium in bis(phosphinobenzylsilane) complexes, Virginia Montiel-Palma, Miguel A. Muñoz-Hernández, Tahra Ayed, Jean-Claude Barthelat, Mary Grellier, Laure Vendier, Sylviane Sabo-Etienne, *Chem. Commun.*, 3963–3965, 2007, DOI: 10.1039/B709408F.
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Hernández-Lamoneda, *Int. J. Quantum Chem.* **112**, 3630-3636, 2012; DOI: 10.1002/qua.24294.

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72. Opening for the Synthesis of Dihydropyran Steroidal Frameworks, Regioselective Spirostan E-Ring, Hilario-Martínez, J. C.; Zeferino-Díaz, R.; Muñoz-Hernández, M. A.; Hernández-Linares, M. G.; Cabellos, J. L.; Merino, G.; Sandoval-Ramírez, J.; Jin, Z.; Fernández-Herrera, M. A., *Org. Lett.* **18**, 1772–1775, 2016, DOI: 10.1021/acs.orglett.6b00492.
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75. Alkyl Al, Ga and Zn complexes chelated by mono-*O*-thiocarbamate-phenol ligands: synthesis, characterization and activity as Diels-Alder catalysts, Patricia De la Cruz-Burelo, JudithCaballero-Jiménez, VirginiaMontiel-Palma, Miguel-ÁngelMuñoz-Hernández, *Inorg. Chim. Acta*, **473**, 236-244, 2018, DOI: 10.1016/j.ica.2017.12.031.
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77. Ring-opening polymerization of *rac*-lactide by Al(III) and Zn(II) complexes incorporating Schiff base ligands derived from pyrrole-2-carboxaldehyde, Ernesto Rufino-Felipe, Nazario Lopez, Fabio A. Vengoechea-Gómez, Luis-Guillermo Guerrero-Ramírez, and Miguel-Ángel Muñoz-Hernández, *Applied Organomet. Chem*., **32**:e4315, 2018. DOI: 10.1002/aoc.4315.

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80. Tetranuclear Complexes of Group 12 and 13 Supported on a Polynucleating Ligand and Activity Studies in the ROP of Rac-Lactide, Caballero-Jiménez, D.-J.; García-de-Jesús, O.-J.; Lopez, N.; Reyes-Ortega, Y.-G.; Muñoz-Hernández, M.-Á., *Inorganica Chim. Acta*, **489**, 120–125, 2019, DOI: 10.1016/j.ica.2019.02.007.
81. Exploiting the Versatility of Phosphinobenzylsilanes for the Stabilization of 14-Electron Rhodium(III) and Iridium(III) Complexes, Corona-González, M. V.; Zamora-Moreno, J.; Muñoz-Hernández, M. A.; Vendier, L.; Sabo-Etienne, S.; Montiel-Palma, V., *Eur. J. Inorg. Chem*. **2019**, 1854–1858, 2019, DOI: 10.1002/ejic.201900107.

Book chapters

1. M. A. Muñoz-Hernández, "Arsenic: Inorganic Chemistry", in *Encyclopedia of Inorganic Chemistry*, John Wiley and Sons, Inglaterra, 2005, ISBN: 0-470-86078-2.

Grants

Total Awarded to date: $624,578.00 USD (For laboratory equipment, chemicals, glassware and conferences)

1. Proyect title**:** Cationes, Precursores Unimoleculares de Nitruros y Modelos Solubles de Zeolitas del Grupo 13 (Al, Ga)
   Agency: CONACyT
   Reference: J30234-E
   Period: January 2000-December 2002
   Amount: $1,065,090.00 Mexican peso ($112, 114.00 USD)

2. Proyect title**:** New Molecular Models of Group 13 Phosphate and Phosphate-Siloxane Materials with Ligands that Incorporate Amine, Phosphonate and Silanol Functionalities
   Agency: UCMEXUS-CONACyT
   Reference: No aplica
   Period: July 2000-June 2002
   Amount: $25,000.00 USD

3. Proyect title**:** Hybrid Inorganic-Organic Materials
   Agency: CONACyT-CIAM
   Reference: U40274-K
   Period: January 2004-December 2006
   Amount: $678, 900 Mexican peso ($60,080.00 USD)

4. Proyect title**:** Proyecto de Consolidación CA-UAEMor-80
   Agency: SEP
   Reference: NA
   Period: March 2007-February 2008
   Amount: $246, 000 Mexican peso ($22,569.00 USD)

5. Proyect title**:** Complejos metálicos de Mg, Al y Zn basados en ligantes multidentados y su evaluación catalítica en polimerización de olefinas y ésteres cíclicos

Agency: CONACyT
Reference: 54151-G
Period: June 2007-May 2010
Amount: $1,835,000 Mexican peso ($168,349.00 USD).

6. Proyect title**:** Síntesis y Caracterización de Complejos Organometálicos de Aluminio Soportados por Ligantes 1,2-fenilenbis(iminopirrol)
Agency: CONACyT-SNI, convocatoria apoyo tesis de licenciatura
Reference: 104416
Period: December 2008-December 2009
Monto: $43,000 Mexican peso ($3,874.00 USD)

7. Proyect title**:** Proyecto de Consolidación CA-UAEM-80
Agency: SEP
Reference: NA
Period: July 2009-November 2009
Amount: $100,000 Mexican peso ($7,407.00 USD)

8. Proyect title**:** Complejos con metales de transición y metales represenativos
Agency: PROMEP-UAEM
Reference: NA
Period: November 2010-February 2011
Amount: $70,000 Mexican peso ($5,785.00 USD).

9. Proyect title: Complejos de Al, Mg y Zn en catálisis y química supramolecular
Agency: CONACyT
Reference: 155247
Period: March 2012-April 2015
Amount: $1,368,785.00 Mexican peso ($104,487.00 USD).

10. Proyect title: Proyectos de investigación de cuerpos académicos para la mejora de su grado de consolidación y fortalecimiento de sus lineas generales y aplicación del conocimiento (LGAC) 2013;
Complejos con metales transicionales y representativos
Agency: UAEM
Period: September 2013-November de 2013
Amount: $95,000.00 Mexican peso ($7,422.00 USD)

11. Proyect title: Complejos de Al, Mg y Zn en catálisis y química supramolecular
Agency: Proyectos de Investigación de Cuerpos Académicos de la Secretaría de Investigación UAEM

Reference:	14/224
Period:	August 2014-July 2015
Amount:	$100,000.00 Mexican peso ($7,519.00 USD)

12. Proyect title:	Red Temática de Química de Coordinación (CA-UAEM-80)
Agency:	PRODEP
Reference:	October 2015-September 2016
Amount:	$300,000.00 Mexican peso ($18,937.00 USD)

13. Proyect title:	Complejos de Al, Mg y Zn en Catálisis y Química Supramolecular (Continuación)
Agency:	CONACyT
Reference:	259081
Period:	September 2016-October 2019
Amount:	$1,499,138.00 Mexican peso ($81,035.00 USD)

Undergraduate and graduate supervision

Undergraduate final project supervision

- Approximately one-year or longer experimental laboratory work and written report followed by *viva voice* examination in front of a jury of 3
  - Graduated 10 students from 2000 to date
  - Currently in progress: 4 students

MPhil supervision

- Approximately two-year or longer experimental laboratory work and written dissertation followed by *viva voice* examination in front of a jury of 3-5
  - Graduated 6 students from 2003 to date
  - Currently in progress: 1 student

Ph.D supervision

- Approximately four-year or longer experimental laboratory work and written dissertation followed by *viva voice* examination in front of a jury of 5-7
  - Graduated 6 students from 2005 to date
  - Currently in progress: 1 student

Postdoctoral supervision (5)

Total Awarded to date: $131,515.00 USD

1. Project title: Compuestos catiónicos basados en Al y ligantes donadores con O y N
   Name: Dr. Alejandro Meta Magaña
   Agency: CONACyT, reference 050287
   Amaount $200,000.00 Mexican peso ($18,349.00 USD)
   Period: January 2006-December 2006

2. Project title: Polimerización de Ésteres Cíclicos en Fase Homogénea Catalizada por Complejos de Mg y Zn Basados en Ligantes Multidentados
   Name: Dr. Raúl Ramírez Trejo
   Agency: CONACyT, reference 55919
   $240,000.00 Mexican peso, ($22,018.00 USD)
   Period: November 2006-October 2007

3. Project title: Complejos de aluminio catiónico y neutrales como sensores del ion fluoruro
   Name: Dr. Zureima García Ramírez
   Agency: CONACyT, reference 123605
   $536,000.00 Mexican peso, ($42, 540.00 USD)
   Period: September 2008-August 2010

4. Project title: Complejos del grupo principal en la ROP de *rac*-lactida
   Name: Dr. Judith Caballero Jiménez
   Agency: SEP-PRODEP
   $384,000.00 Mexican peso ($24,304.00 USD)
   Period: February 2015-January 2017

5. Project title: Complejos del grupo principal en la ROP de *rac*-lactida
   Name: Dr. Judith Caballero Jiménez
   Agency: CONACyT, reference
   $384,000.00 Mexican peso ($24,304.00 USD)
   Period: February 2015-January 2017

Teaching experience

At UAEM I have taught the following courses at undergraduate and graduate level since 2000 (normally between 2 and 3 per semester):

- General Chemistry
- Coordination Chemistry
- Organometallic Chemistry
- Main Group chemistry and Periodic Trends
- General Chemistry Laboratory
- Coordination Chemistry Laboratory
- Structural Analysis by X-ray Diffraction
- Chemistry of Materials
- Materials and Nanochemistry Laboratory

At UNAM (1992-1997) Lecturer for

- Laboratory of Analytical Chemistry
- Laboratory of Main Group Chemistry

Languages

Spanish: Mother thongue

English