

Arturo J. Hernández-Maldonado

NanoEngineer

University of Puerto Rico, Mayagüez Campus



Biography

Hernández-Maldonado is an Associate Professor at the Department of Chemical Engineering of the [University of Puerto Rico, Mayagüez Campus](#) (UPRM). He earned his Ph.D. degree in Chemical Engineering at the [University of Michigan](#) in 2004. Hernández is a recipient of the prestigious [National Science Foundation CAREER Award](#) (2006-2011) and the UPRM Outstanding Chemical Engineer Professor award for 2005, 2006 and 2008, respectively. His research team is developing techniques to synthesize novel adsorbent materials for applications that include natural gas purification, water ultra-purification, and production of alternate fuels. Part of this work will also influence many of the initiatives envisioned under the Nanotechnology Based Remediation Interdisciplinary Group of the PR-EPSCoR Institute for Functional Nanomaterials (IFN).

Teams

[Educational Team](#), [Cluster II: Functional Nanostructures at the Interface](#)

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Education

- Ph.D. in [Chemical Engineering, University of Michigan](#) (2004)

Appointments

2006– present Chemical Engineering Associate Professor, University of Puerto Rico-Mayagüez, Mayagüez, PR, United States
2009– present Honorary Fellow – Chemical and Biological Engineering Department, University of Wisconsin-Madison, Madison, Wisconsin, United States
2006– 2009 Honorary Fellow – Material Science and Engineering Department, University of Wisconsin-Madison, Madison, Wisconsin, United States
2004– 2006 Chemical Engineering Assistant Professor, University of Puerto Rico-Mayagüez, Mayagüez, PR, United States
2000– 2004 Research Assistant, University of Michigan, Ann Arbor, MI, United States
1999– 2000 Chemical Engineering Unit Operations Laboratory Director, University of Puerto Rico-Mayagüez, Mayagüez, PR, United States
1997– 2000 Chemical Engineering Lecturer, University of Puerto Rico-Mayagüez, Mayagüez, PR, United States

Honors and awards

- 2006 - 2011 NSF-CAREER Award, National Science Foundation
- 2004 - 2005, 2005 - 2006, 2007 - 2008 Chemical Engineering Outstanding Professor, University of Puerto Rico - Mayagüez
- 2004 University of Michigan, College of Engineering Graduate Distinguished Achievement Award, University of Michigan
- 2003 AIChE Separations Division Graduate Student Research Award in Adsorption and Ion Exchange, American Institute of Chemical Engineers/Praxair
- 2003 ScholarPOWER Academic Award, University of Michigan/General Motors Corporation

Publications

1. Primera-Pedrozo, J.N.; Guerrero-Medina, K.J.; Fu, R.; Hernández-Maldonado, A.J. Sr(II)-UPRM-5 Titanium Silicate Framework Thermally Induced Contraction: *In Situ* High Temperature XRD and ^{29}Si MAS NMR. *Dalton Trans.* **2011**, *in press* (DOI: 10.1039/C0DT01352H).
2. García-Ricard, O.J.; Fu, R.; Hernández-Maldonado, A.J. Thermally Induced Changes in a Porous Coordination Polymer $\{\text{Cu}_2(\text{pyrazine-2,3-dicarboxylate})_2(4,4'\text{-bipyridine})\}$ Studied via *in situ* X-ray Diffraction and ^{13}C Cross-Polarization Magic Angle Spinning Nuclear Magnetic Resonance Spectroscopy. *J. Phys. Chem. C* **2011**, *115*, 3595.

3. Rivera-Jiménez, S.M.; Lehner, M.M.; Cabrera-Lafaurie, W.A.; Hernández-Maldonado, A.J. The Removal of Naproxen, Salicylic Acid, Clofibrilic Acid, and Carbamazepine by Water Phase Adsorption onto Inorganic-Organic Intercalated Bentonites Modified with Transition Metal Cations. *Environ. Eng. Sci.* **2011**, *28*, 171.
4. Zhang, L.; Primera-Pedrozo, J.N.; Hernández-Maldonado, A.J. Thermal Detemplation of Na-SAPO-34: Effect on Sr²⁺ Ion Exchange and CO₂ Adsorption. *J. Phys. Chem. C* **2010**, *114*, 14755.
5. Primera-Pedrozo, J.N.; Torres-Cosme, B.D.; Clardy, M.E.; Rivera-Ramos, M.E.; Hernández-Maldonado, A.J. Titanium Silicate Porous Materials for Carbon Dioxide Adsorption: Synthesis Using a Structure Directing Agent, Detemplation and Inclusion of Alkaline Earth Metal Cations. *Ind. Eng. Chem. Res.* **2010**, *49*, 7515.
6. Rivera-Jiménez, S.M.; Méndez-González, S.; Hernández-Maldonado, A.J. Metal (M=Co²⁺, Ni²⁺ and Cu²⁺) Grafted Mesoporous SBA-15: Effect of Transition Metal Incorporation and pH Conditions on the Adsorption of Naproxen from Water. *Micropor. Mesopor. Mat.* **2010**, *132*, 470.
7. García-Ricard, O.J.; Hernández-Maldonado, A.J. Cu₂(pyrazine-2,3-dicarboxylate)₂(4,4'-bipyridine) Porous Coordination Sorbents: Activation Temperature, Textural Properties and CO₂ Adsorption at Low Pressure Range. *J. Phys. Chem. C* **2010**, *114*, 1827.
8. Arévalo-Hidalgo, A.G.; Santana, J.A.; Fu, R.; Ishikawa, Y.; Hernández-Maldonado, A.J. Separation of CO₂ from Light Gas Mixtures using Nanoporous Silicoaluminophosphate Sorbents: Effect of Multiple-Step Ion Exchange and Adsorption Mechanism via Computational Studies. *Micropor. Mesopor. Mat.* **2010**, *130*, 142.
9. Belén-Cordero, D.S.; Chul, K.; Hwang, S.J.; Hernández-Maldonado, A.J. SBE-Type Metal-Substituted Aluminophosphates: Detemplation and Coordination Chemistry. *J. Phys. Chem. C* **2009**, *113*, 8035.
10. Rivera-Jiménez, S.M.; Hernández-Maldonado, A.J. Nickel(II) Grafted MCM-41: A Novel Sorbent for the Removal of Naproxen from Water. *Micropor. Mesopor. Mat.* **2008**, *116*, 246.
11. Rivera-Ramos, M.; Ruiz-Mercado, G.J.; Hernández-Maldonado, A.J. Separation of CO₂ from Light Gases Mixtures using Ion-Exchanged Silicoaluminophosphate Nanoporous Sorbents. *Ind. Eng. Chem. Res.* **2008**, *47*, 5602.
12. Belén-Cordero, D.S.; Méndez-González, S.; Hernández-Maldonado, A.J. SBE Type Cobalt Aluminophosphate Nanoporous Materials: Degradation of the Structure-Directing Agent. *Micropor. Mesopor. Mat.* **2008**, *109*, 287.
13. Rivera-Ramos, M.; Hernández-Maldonado, A.J. Adsorption of N₂ and CH₄ by Ion-Exchanged Silicoaluminophosphate Nanoporous Sorbents: Interaction with Monovalent, Divalent and Trivalent Cations. *Ind. Eng. Chem. Res.* **2007**, *46*, 4991.
14. Hernández-Maldonado, A.J.; Qi, G.; Yang, R.T. Desulfurization of Commercial Fuels by π -Complexation: Monolayer CuCl/ γ -Al₂O₃. *Appl. Catal. B-Environ.* **2005**, *61*, 212.

15. Hernández-Maldonado, A.J.; Yang, F. H.; Qi, G; Yang, R.T. Desulfurization of Transportation Fuels by π -Complexation Sorbents: Cu(I)-, Ni(II)-, and Zn(II)-Zeolites. *Appl. Catal. B-Environ.* **2005**, *56*, 111.
16. Hernández-Maldonado, A.J.; Yang, R.T. New Sorbents for Desulfurization by Selective Adsorption via π -Complexation: Sulfur Removal from Diesel Fuels. *AIChE J.* **2004**, *50*, 791.
17. Hernández-Maldonado, A.J.; Yang, R.T. Desulfurization of Diesel Fuels by Adsorption via π -Complexation with Vapor Phase Exchanged (VPIE) Cu(I)-Y Zeolites. *J. Am. Chem. Soc.* **2004**, *126*, 992 (American Chemical Society)
18. Hernández-Maldonado, A.J.; Yang, R.T. Denitrogenation of Transportation Fuels by Zeolites at Ambient Temperature and Pressure. *Angew. Chem. Int. Edit.* **2004**, *43*, 1004.
19. Hernandez-Maldonado, A. J.; Yang, R. T. Desulfurization of Diesel Fuels via π -Complexation with Nickel(II)-Exchanged X- and Y-Zeolites. *Ind. Eng. Chem. Res.* **2004**, *43*, 1081.
20. Hernandez-Maldonado, A. J.; Stamatias, S. D.; Yang, R. T.; He, A. Z.; Cannella, W. New Sorbents for Desulfurization of Diesel Fuels via π Complexation: Layered Beds and Regeneration. *Ind. Eng. Chem. Res.* **2004**, *43*, 769.
21. Jayaraman, A.; Hernández-Maldonado, A.J.; Yang, R.T.; Chinn, D.; Munson, C.L.; Mohr, D.H. Clinoptilolites for Nitrogen/Methane Separation. *Chem. Eng. Sci.* **2004**, *59*, 2407.
22. Yang, F. H.; Hernández-Maldonado, A. J.; Yang, R. T. Selective Adsorption of Organosulfur Compounds from Transportation Fuels by π -Complexation. *Sep. Sci. Technol.* **2004**, *39*, 1717.
23. Hernández-Maldonado, A.J.; Yang, R.T. Desulfurization of Transportation Fuels by Adsorption. *Catal. Rev.-Sci. Eng.* **2004**, *46*,111.
24. Hernández-Maldonado, A.J.; Yang, R.T.; Cannella, W. Desulfurization of Commercial Jet Fuels by Adsorption via π -Complexation with Vapor Phase Exchanged (VPIE) Cu(I)-Y Zeolites. *Ind. Eng. Chem. Res.* **2004**, *43*, 6142. (American Chemical Society)
25. Yang, R.T.; Hernández-Maldonado, A.J.; Yang, F.H. Desulfurization of Transportation Fuels with Zeolites at Ambient Temperature and Pressure. *Science* **2003**, *301*, 79.
26. Hernández-Maldonado, A.J.; Yang, R.T.; Chinn, D.; Munson, C.L. Partially Calcined Gismondine Type Silicoaluminophosphate SAPO-43: Isopropylamine Elimination and Separation of Carbon Dioxide, Hydrogen Sulfide, and Water. *Langmuir* **2003**, *19*, 2193. (American Chemical Society)
27. Hernández-Maldonado, A.J.; Yang, R.T. Desulfurization of Commercial Liquid Fuels by Selective Adsorption via π -Complexation with Cu(I)-Y Zeolite. *Ind. Eng. Chem. Res.* **2003**, *42*, 3103. (American Chemical Society)
28. Hernández-Maldonado, A.J.; Yang, R.T. Desulfurization of Liquid Fuels by Adsorption via π -Complexation with Cu(I)-Y and Ag-Y Zeolites. *Ind. Eng. Chem. Res.* **2003**, *42*, 123. (American Chemical Society)

Grants

1. A. J. Hernández, Y. Ishikawa, B. Luna, G. Morell, and R. G. Raptis. A Combined Experimental and Theoretical Approach for the Development of Selective Nanoporous Gas Sorbents for the Effective Restoration of Breathing Air in Crewed Space Craft, National Aeronautics and Space Administration, EPSCoR, 3 years, October 2009, Multiple PIs, Pending, \$1,350,000.
2. F. M. Aliev, C. R. Cabrera, L. F. Fonseca, K. H. Griebenow, A. J. Hernández, Y. Ishikawa, R. S. Katiyar, M. M. Martínez, A. R. Mayol, G. Morell, W. Otaño, R. G. Raptis, and B. R. Weiner. Center for Advanced Nanoscale Materials (CANM) NASA University Research, National Aeronautics and Space Administration, URC, 5 years, October 2008, Multiple PIs, Approved, \$6,000,000.
3. N. Cardona, A. J. Hernández, P. Kohl, A. M. Padovani, O. J. Perales, R. G. Raptis, C. Rinaldi, J. Santos, N. Sepúlveda, G. Serrano, D. Suleiman, O. M. Suárez, and M. Torres. Nanotechnology Center for Biomedical and Energy Driven Systems and Applications (NCBEDSA), National Science Foundation, CREST, 5 years, September 2008, Multiple PIs, Approved, \$5,000,000.
4. A. J. Hernández. CAREER: A Research and Education Program in Nanostructured Materials for Adsorption Based Separations at the Univ. of Puerto Rico, Mayaguez, National Science Foundation, CAREER, 5 years, July 2006, Single PI, Approved, \$400,000.

Presentations

1. “Novel Nanoporous Materials for Catalysis, Space and Environmental Applications.” A.J. Hernández-Maldonado, *Department of Chemical and Biomolecular Engineering, Rice University, Houston, TX – September 2010*
2. “Textural and Adsorption Properties of CPL-2 Type Porous Coordination Polymers.” O.J. García-Ricard and A.J. Hernández-Maldonado, *Spring 2010 ACS National Meeting, San Francisco, CA – March 2010*
3. “A Flexible Titanium Silicate Nanoporous Sorbent for CO₂ Adsorption from Light Gas Mixtures.” J.N. Primera-Pedrozo and A.J. Hernández-Maldonado, *Spring 2010 ACS National Meeting, San Francisco, CA – March 2010*
4. “Separation of CO₂ from Light Gas Mixtures using Nanoporous Silicoaluminophosphate Sorbents.” A.G. Arévalo-Hidalgo and A.J. Hernández-Maldonado, *Spring 2010 ACS National Meeting, San Francisco, CA – March 2010*
5. “Metal Grafted Mesoporous SBA-15: Effect of Transition Metal Incorporation on the Adsorption of Naproxen from Water.” S.M. Rivera- Jiménez and A.J. Hernández-Maldonado, *Spring 2010 ACS National Meeting, San Francisco, CA – March 2010*
6. “SBE-Type Metal-Substituted Aluminophosphates: Synthesis, Detemplation and Characterization.” A.J. Hernández-Maldonado, *61st Southeastern Regional Meeting of the American Chemical Society, San Juan, PR – October 2009*
7. “Separation of CO₂ from Light Gas Mixtures using Alkaline Earth Metal-Exchanged Silicoaluminophosphate Nanoporous Sorbents.” A.J. Hernández-

- Maldonado, *Technical Interchange Meeting on the Development of Loop Closure Technologies, NASA Marshall Space Flight Center, Huntsville, Al – August 2009*
8. “Selective Carbon Dioxide Adsorption using Zorite-like Flexible Nanoporous Titanosilicates.” A.J. Hernández-Maldonado, *Technical Interchange Meeting on the Development of Loop Closure Technologies, NASA Marshall Space Flight Center, Huntsville, Al – August 2009*
 9. “Synthesis and Characterization of Nanoporous Coordination Polymers for Carbon Dioxide Adsorption and Storage Applications.” O.J. García-Ricard and A.J. Hernández-Maldonado, *HBCU/OMSI Aerospace Collaboration Symposium, NASA Glenn Research Center, Cleveland, OH – July 2009*
 10. “Novel Nanoporous Materials for Catalytic and Adsorption Applications.” A.J. Hernández-Maldonado, *National High Magnetic Field Lab, Florida State University, Tallahassee, Fl – June 2009*
 11. “Selective Porous Gas Sorbents for Space Life Support Systems: A Combined Experimental and Theoretical Approach.” J. A. Santana, A.J. Hernández-Maldonado and Y. Ishikawa, *215th ECS Meeting, San Francisco – May 2009*
 12. “Novel Nanoporous Materials for Catalytic and Adsorption Applications.” A.J. Hernández-Maldonado, *Chemical Engineering Department, University of South Carolina, Columbia, SC – February 2009*
 13. “Synthesis and Characterization of SBE-Type MeAPOs (Me = Co and Mg).” D.S. Belen and A.J. Hernández, *Spring 2008 ACS National Meeting, New Orleans, LA – April 2008*
 14. “Nanoporous Materials: Synthesis, Characterization and Adsorption Applications.” A.J. Hernández-Maldonado, *NASA Ames Research Center, ECLS Atmosphere Revitalization Group – February 2008*
 15. “Removal of CO₂ from Light Gas Mixtures: Tailored Silicoaluminophosphate Nanoporous Sorbents.” A.J. Hernández-Maldonado, *NSF EPSCoR National Meeting, Waikoloa, Hawaii – November 2007*
 16. “Nanoporous Materials: Synthesis, Characterization and Adsorption Applications.” A. J. Hernández-Maldonado, *University of Puerto Rico – Río Piedras, Chemistry Department Lecture Series – May 2007*
 17. “Adsorption of TNT and Its Degradation Products in Soil Matter: *Ab Initio* Calculations.” M. Irrazabal, J. Briano and A. Hernández, *ACS National Meeting, Chicago – March 2007*
 18. “New Silicoaluminophosphate and Titanosilicate Nanoporous Sorbents for Gas Phase Separations.” M. Rivera-Ramos and A.J. Hernández-Maldonado, *AIChE National Meeting, San Francisco – November 2006*
 19. “Cobalt Aluminophosphate Nanoporous Sorbents: Hofmann Degradation of the Structure-Directing Agent and Post-Synthesis Treatments.” D.S. Belén-Cordero and A.J. Hernández-Maldonado, *InQu/ACS Advances in Chemical Sciences and Engineering in Puerto Rico, Puerto Rico – November 2006*
 20. “Pharmaceutical Co-Crystals Nanoporous Sorbents.” Y. Pagán-Torres and A.J. Hernández-Maldonado, *41st ACS Junior Technical Meeting and 26th Puerto Rico Interdisciplinary Scientific Meeting – March 2006*

21. "Removal of the Structure Directing Agent from a Thermally Unstable Metal Substituted Aluminophosphate." D.S. Belén-Cordero and A.J. Hernández-Maldonado, *AIChE National Meeting, Cincinnati – November 2005*