JOHN MARK P. MARTIREZ, Ph. D.
D318 Engineering Quadrangle
Department of Mechanical and Aerospace Engineering
Princeton University,
Princeton, New Jersey 08544, USA
email: **MARTIREZ@princeton.edu**
phone: **215-667-9426**

professional website:
https://martirez.github.io

Professional Appointments

2015 – current **Postdoctoral Research Associate**
Advisor: **Prof. Emily A. Carter**
Princeton University
Princeton, New Jersey, United States

2006 – 2008 **University Instructor**
Institute of Chemistry, University of the Philippines - Diliman
Diliman, Quezon City, Metro Manila, Philippines
Full-time laboratory instructor in undergraduate laboratories

Education

2015 **Ph.D. in Chemistry**
Advisor: **Prof. Andrew M. Rappe**
University of Pennsylvania
Philadelphia, Pennsylvania, United States

2006 **B.S. in Chemistry**, ***Magna cum Laude***
University of the Philippines - Diliman
Diliman, Quezon City, Metro Manila, Philippines

Patent

1. J. M. P. Martirez, S. Kim, and A. M. Rappe, Synergistic Oxygen Evolving Activity of Non-Stoichiometric Surfaces. ***United States Letters Patent No*.: 9,469,908**. Issued October 18, 2016

Publications (* shared first authorship)

14. J. M. P. Martirez, and E. A. Carter, Prediction of a Low-Temperature N_2 Dissociation Catalyst Exploiting Near IR-to-Visible Light Nanoplasmonics. *submitted* (2017)
13. L. D. Chen, M. Bajdich, J. M. P. Martirez, C. M. Krauter, J. A. Gauthier, E. A. Carter, A. C. Luntz, K. Chan, and J. K. Norskov, The Charge of an Ion in the Outer Helmholtz Plane. *to be submitted* (2017)
12. R. B. Wexler, J. M. P. Martirez, and A. M. Rappe, Active Role of Phosphorus in the Hydrogen Evolving Activity of Nickel Phosphide (0001) Surfaces. *submitted* (2017)

11. J. M. P. Martirez, and E. A. Carter, Excited-State N_2 Dissociation Pathway on Fe-Functionalized Au. ***J. Am. Chem. Soc.,*** **139**, 4390-4398 (2017) DOI: 10.1021/jacs.6b12301
10. D. F. Swearer, H. Zhao, L. Zhou, C. Zhang, H. Robatjazi, J. M. P. Martirez, C. M. Krauter, S. Yazdi, M. J. McClain, E. Ringe, E. A. Carter, P. Nordlander, N. J. Halas, Heterometallic Antenna-Reactor Complexes for Photocatalysis. ***Proc. Natl. Acad. Sci.*** **113**, 8916-8920 (2016) DOI: 10.1073/pnas.1609769113
9. R. B. Wexler, J. M. P. Martirez, and A. M. Rappe, Stable Phosphorus Enriched (0001) Surfaces of Nickel Phosphides. ***Chem. Mater.*** **28**, 5365-5372 (2016) DOI: 10.1021/acs.chemmater.6b01437
8. J. M. P. Martirez, and E. A. Carter, Thermodynamic Constraints in Using Au*M* (*M*= Fe, Co, Ni and Mo) Alloys as N_2 Dissociation Catalysts: Functionalizing a Plasmon-Active Metal. ***ACS Nano*** **10**, 2940-2949 (2016) DOI: 110.1021/acsnano.6b00085
7. Y. Qi, J. M. P. Martirez, W. A. Saidi, J.J. Urban, W.S. Yun, J.E. Spanier and A. M. Rappe, Modified Schottky emission to explain thickness dependence and slow depolarization in $BaTiO_3$ nanowires. ***Phys. Rev. B*** **91**, 245431 (2015) DOI: 10.1103/PhysRevB.91.245431
6. J. M. P. Martirez, S. Kim, E. H. Morales, B. T. Diroll, M. Cargnello, T. R. Gordon, C. B. Murray, D. A. Bonnell, and A. M. Rappe, Synergistic Oxygen Evolving Activity of a TiO_2-rich Reconstructed $SrTiO_3$(001) Surface. ***J. Am. Chem. Soc.*** **137**, 2939-2947 (2015) DOI: 10.1021/ja511332y
5. C. Baeumer, D. Saldana-Greco, J. M. P. Martirez, A. M. Rappe, M. Shim, and L. W. Martin, Ferroelectrically Driven Spatial Carrier Density Modulation in Graphene. ***Nat. Commun.*** **6**:6136 (2015) DOI: 10.1038/ncomms7136
4. W. A. Saidi*, J. M. P. Martirez*, and A. M. Rappe, Strong Reciprocal Interaction between Polarization and Surface Stoichiometry in Ferroelectric Oxides. ***Nano Lett.*** **14**, 6711-6717 (2014) DOI: 10.1021/nl5035013
3. N. Koocher, J. M. P. Martirez, and A. M. Rappe, Theoretical Model of Oxidative Adsorption of Water on a Highly Reduced Reconstructed Oxide Surface. ***J. Phys. Chem. Lett.*** **5**, 3408-3414 (2014) DOI: 10.1021/jz501635f
2. E. H. Morales*, J. M. P. Martirez*, W. A. Saidi, A. M. Rappe, and D. A. Bonnell, Coexisting Surface Phases and Coherent One-Dimensional Interfaces on $BaTiO_3$(001). ***ACS Nano*** **8**, 4465-4473 (2014) DOI: 10.1021/nn501759g
1. J. M. P. Martirez, E. H. Morales, W. A. Saidi, D. A. Bonnell, and A. M. Rappe, Atomic and Electronic Structure of the $BaTiO_3$ (001) ($\sqrt{5}\times\sqrt{5}$) *R*26.6° Surface Reconstruction. ***Phys. Rev. Lett.*** **109**, 256802 (1-5) (2012) DOI: 10.1103/PhysRevLett.109.256802

Talks and Presentations

Talks

10. "Plasmon-induced excited-state heterogeneous catalysis on surface-doped metallic nanoparticles" **253rd American Chemical Society National Meeting and Exposition**, San Francisco, California, USA (April 2017)
9. ***Invited*****:** "Modeling Surface Phenomena via First-Principles Quantum Mechanics" **Center for Functional Nanomaterials, Brookhaven National Laboratory**, Upton, New York, USA (January 19, 2017)

8. ***Invited*:** "Excited-State Heterogeneous Catalysis on Metallic Nanoparticles" **2016 MRS Fall Meeting and Exhibit**, Boston, Massachusetts, USA (November 28 – December 2, 2016)
7. "Excited State Dissociation Pathway for N_2 on Fe-substituted Plasmon-Active Au" **AFOSR MURI Meeting**, Rice University, Houston, Texas, USA (May 2016)
6. ***Invited*:** "Role of charge-transfer excitations in Au-Fe alloys for heterogeneous N_2 dissociation catalysis" **251st American Chemical Society National Meeting and Exposition** (Computers in Chemistry), San Diego, California, USA (March 13-17, 2016)
5. "Dual active-site catalyst based on a single element for synergistic water-splitting", **9th International Workshop on Oxide Surfaces (IWOX- IX),** Granlibakken Conference Center, Tahoe City, California, USA (January 2014) *on behalf of Prof. Andrew M. Rappe*
4. "Thermodynamic and Kinetic Exploration of Surface Phase Coexistence on an Oxide Surface", **9th International Workshop on Oxide Surfaces (IWOX- IX)**, Granlibakken Conference Center, Tahoe City, California, USA (January 2014)
3. "Polarization Dependent Reconstructions of Ferroelectric Surfaces ", **APS March Meeting,** Boston, Massachusetts, USA (March 1, 2012)
2. "Hydration phase diagram for BaO terminated $BaTiO_3$", **APS March Meeting**, Dallas, Texas, USA (March 22, 2011)
1. "Theoretical study on the diffusion of hydroxyl radical on BaO terminated $BaTiO_3$(001) surface", **APS March Meeting,** Portland, Oregon, USA (March 18, 2010)

Posters

8. "Modeling Local Excited States on Surface Reactive Sites: An Exploration of Plasmon-Catalyzed CH_4 Dehydrogenation on Ru-functionalized Cu and N_2 Dissociation on Fe-functionalized Au" *AFOSR MURI Review Meeting*, Rice University, Houston, Texas, USA (December 7, 2016)
7. "Surface Functionalization of Plasmon-Active Au for Sustainable Ammonia Synthesis" *Andlinger Center Building Opening Celebration and Symposium*, Princeton University, Princeton, New Jersey, USA (May 2016)
6. "TiO-rich reconstructions of $BaTiO_3$(001) surface: The thermodynamics and kinetics of surface defect agglomeration leading to phase coexistence." *Dynamics, Interactions, and Electronic Transitions at Surfaces (DIET14 workshop)*, Pacific Grove, California, USA (October 2014)
5. "Synergistic Oxygen Evolving Activity of a Dual Active-site Catalysts Based on a Single Element", *Gordon Conference - Dynamics at Surfaces*, Salve-Regina University, Rhode Island, USA (August 2013)
4. "Strong Reciprocal Interaction between Polarization and Surface Stoichiometry in Ferroelectric Oxides*", International Workshop on Interfaces at Bear Creek*, Bear Creek Mountain Resort and Conference Center, Pennsylvania, USA (October 2012)
3. "Connection between relaxation of metastable polarization and time evolution of surface ion coverage in $BaTiO_3$ nanowires", *2011 Workshop on the Fundamental Physics of Ferroelectrics and Related Materials*, Gaithersburg, Maryland, USA (January 2011)
2. "First principle investigation of hydrogen transfer between surface adsorbed H_2O and OH on BaO (001) surface of thin film $BaTiO_3$", *ACS National meeting*, Boston, Massachusetts, USA (August 2010)
1. "First principles investigation of surface dynamics involving OH on thin-film $BaTiO_3$ surfaces", *22nd Annual Workshop on Electronic Structure Methods*, Austin, Texas, USA (June 2010)