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Professional Appointments

- | | |
|----------------|--|
| 2015 – current | Postdoctoral Research Associate
<i>Advisor: Prof. Emily A. Carter</i>
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 |

Education

- | | |
|------|---|
| 2015 | Ph.D. in Chemistry
<i>Advisor: Prof. Andrew M. Rappe</i>
University of Pennsylvania
Philadelphia, Pennsylvania, United States |
| 2006 | B.S. in Chemistry, <i>Magna cum Laude</i>
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. 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. Nørskov, Understanding the apparent fractional charge of ions in the aqueous electrochemical double layer. ***Nat. Commun.*** *under review* (2017)
13. J. M. P. Martirez, and E. A. Carter, Prediction of a Low-Temperature N₂ Dissociation Catalyst Exploiting Near IR-to-Visible Light Nanoplasmonics. ***Sci. Adv.***, *under review* (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. ***ACS Catal.***, *in press* (2017)

11. J. M. P. Martirez, and E. A. Carter, Excited-State N₂ 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. Robotjazi, 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 AuM (M= Fe, Co, Ni and Mo) Alloys as N₂ Dissociation Catalysts: Functionalizing a Plasmon-Active Metal. *ACS Nano* **10**, 2940-2949 (2016) DOI: 10.1021/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 BaTiO₃ 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 TiO₂-rich Reconstructed SrTiO₃(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 BaTiO₃(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 BaTiO₃ (001) ($\sqrt{5} \times \sqrt{5}$) R26.6° Surface Reconstruction. *Phys. Rev. Lett.* **109**, 256802 (1-5) (2012) DOI: 10.1103/PhysRevLett.109.256802

Students Mentored

Alexander J. Tkalych, *graduate*, Princeton University, Fall 2017-present
Robert B. Wexler, *graduate*, University of Pennsylvania, Summer 2014-present (with ongoing mentoring and collaborations)
Joe Abbate, *undergraduate*, Princeton University, Fall 2015 – Spring 2016
Nicole Belonzi, *graduate*, University of Pennsylvania, Summer 2014
Nathan Z. Koocher, *undergraduate*, University of Pennsylvania, Fall 2011 – Fall 2014

Recent Referee Services (while at Princeton)

ACS Catalysis, Nature Nanotechnology, The Journal of Physical Chemistry Letters, Angewandte Chemie

Courses Taught

Undergraduate-level general, analytical, physical, and organic chemistry laboratory courses, University of the Philippines, Diliman, Philippines, 2006-2008

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 N₂ 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 N₂ 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 BaTiO₃”, **APS March Meeting**, Dallas, Texas, USA (March 22, 2011)
1. “Theoretical study on the diffusion of hydroxyl radical on BaO terminated BaTiO₃(001) surface”, **APS March Meeting**, Portland, Oregon, USA (March 18, 2010)

Posters

9. "Excited-State Heterogeneous Catalysis on Surface-Doped Plasmonic Nanoparticles"
Gordon Research Conference – Dynamics at Surfaces, Salve Regina University, Newport, RI, USA (July 30 - August 3, 2017)
8. "Modeling Local Excited States on Surface Reactive Sites: An Exploration of Plasmon-Catalyzed CH₄ Dehydrogenation on Ru-functionalized Cu and N₂ 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 BaTiO₃(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 BaTiO₃ 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 H₂O and OH on BaO (001) surface of thin film BaTiO₃", *ACS National meeting*, Boston, Massachusetts, USA (August 2010)
1. "First principles investigation of surface dynamics involving OH on thin-film BaTiO₃ surfaces", *22nd Annual Workshop on Electronic Structure Methods*, Austin, Texas, USA (June 2010)