Nathan Guisinger

Scientist

Quantum and Energy Materials

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Argonne National Laboratory
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Education

National Research Council Postdoctoral Fellowship, National Institute of Standards and Technology - Gaithersburg
Ph.D. Materials Science and Engineering, Northwestern University
M.S. Electrical Engineering, University of Illinois Urbana-Champaign
B. S. Electrical Engineering, University of Illinois Urbana-Champaign

Awards and honors

- Northwestern University Materials Science Department's Early Career Achievement Award (2018)
- U. Chicago-Argonne Board of Governors Distinguished Performance Award (2017)
- U. Chicago-Argonne Board of Governors Pinnacle of Education Award (2016)
- Director's Team Award for Outstanding Safety Leadership (2011)
- AVS (TFD) Outstanding Young Researcher Award (2007)
- National Research Council Postdoctoral Fellowship (2006)
- AVS Top Level Graduate Research Award (2005)
- Nottingham Prize - Physical Electronics Conference - For probing isolated molecules on silicon (2005)
- Hilliard Symposium - Runner Up "Best Student Presentation"(2005)
- Northwestern University Graham Fellowship (2004)

Research interest

- Accelerated discovery of low-dimensional materials: synthesis, properties, and processing
- Advanced materials for quantum information
- Molecular technology
- Strongly correlated electron materials

Professional Experience

Northwestern University – Department of Materials Science and Engineering 2017-*present*
Adjunct Lecturer/NAISE Fellow

Argonne National Laboratory - Center for Nanoscale Materials (CNM) *2012-present*
Scientist

Argonne National Laboratory - Center for Nanoscale Materials (CNM) *2007-2012*
Assistant Scientist

Nathan Guisinger

Graduate and Professional Advisors

- M.S. Advisor - Prof. Joseph Lyding, Elec. Eng. Dept., Univ. of Illinois at Urbana-Champaign
- Ph.D. Advisor - Prof. Mark Hersam, Department of Materials Science, Northwestern University
- NRC Advisor - Dr. Joseph Stroscio, Electron Physics Group, NIST - Gaithersburg

Postdoctoral Fellows Supervised

(1) Prof. Li Gao, Postdoctoral Fellow, 2009-2012, (Joint with Jeff Guest), Currently Faculty California State University – Northridge
(2) Prof. TeYu Chien, Postdoctoral Fellow, 2009-2012, (Joint with John Freeland), Currently Faculty University of Wyoming
(3) Prof. Jongweon Cho, Postdoctoral Fellow, 2010-2011, Currently Faculty Myongji University
(4) Prof. Erin Iski, Postdoctoral Fellow, 2011-2013, Currently Faculty Tulsa University
(5) Prof. Adina Luican-Mayer, Argonne Named Postdoctoral Fellow, 2012-2015, Currently Faculty University of Ottowa

Ph.D. Students Supervised

(1) Dr. Brian Kiraly, Department of Materials Science, Northwestern University, (Joint with Prof. Mark Hersam), Graduated: June 2016, Currently Postdoc with Prof. Khajetoorians - Raboud University
(2) Dr. Andrew Mannix, Department of Materials Science, Northwestern University, (Joint with Prof. Mark Hersam), Graduated: June 2017, Currently Postdoc with Prof. Jiwoong Park – University of Chicago

External Ph.D. Committees

(1) Pohkeong Ng, Department of Electrical Engineering, University of Illinois – Chicago, June 2014
(2) Jian-Yi Cheng, Department of Mechanical Engineering, University of Illinois – Chicago, June 2016
(3) Shobhit Pandey, Department of Materials Science and Engineering, Northwestern University, expected graduation 2020.

Undergraduate Supervision

(1) Joseph Fiala, Purdue University, Argonne Summer Research Program (2014, 2016)
(2) Emily Tom, Michigan Technological University, Argonne Summer Research Program (2018)

Visiting Faculty

(1) Professor Carmen Lilley, University of Illinois – Chicago, Sabbatical (2014-2015)
(2) Professor Sam Subramaniam, Miles College – Fairfield AL, Summer (2016)

Synergistic Activities, Outreach, Community Service

(National Level; * Local Level)**

(1) * Teaching MSE 380 – Intro to Surface Science Mat. Sci. Northwestern University (2017-present)
(2) ** Advisor, DOE Visiting Faculty Program (2017)
(3) * Argonne Postdoctoral Fellowship Committee – NST (2017-2019)

(4) ** Co-Chair, DMP, APS March Meeting Focus Topic – 2D Materials (11 sessions) (2017)
(5) * Scientific Mentor, Exemplary Student Research Program, Argonne (2016)
(6) ** Advisor, DOE Visiting Faculty Program, Argonne (2016)
(7) ** Mentor, NAACP Act-SO High School Mentorship, Argonne (2014-Present)
(8) ** International Rep., AVS representative for IUVSTA (2016-Present)
(9) ** Observer, Science Undergraduate Laboratory Internship (SULI), Argonne (2016)
(10) ** Co-Chair, APS DMP March Meeting Focus Topic 2D Materials (2016-2017)
(11) ** Panel Member, NSF DMREF Funding Review Panel (2016)
(12) * Panel Member, Writing Winning Proposals Workshop, Argonne (2016)
(13) **Advisory Board, Nanoscience Program Harper College and CLC, (2008-Present)
(14) * Science Fair Judge, The Avery Coonley School, (2016-Present)
(15) *Lab tours for Downers Grove South Science Club, (2014-Present)
(16) *Guest Lecturer, AP Physics Class, Downers Grove South High School, (2014-Present)
(17) *Science Fair Judge, Downers Grove School District 58, (2014-Present)
(18) *Volunteer Youth Leader, Middle School, (COW) CCOB, (2014-Present)
(19) *Volunteer Youth Leader, Elementary, (KidZone) CCOB, (2015-Present)
(20) *Assistant Coach, Lemont Youth Basketball, (2014-2015)
(21) *Volunteer Leader, Middle School, Camp Stampede, (2014-Present)
(22) *Volunteer Leader, Middle School, Camp COW, (2015-Present)
(23) *Volunteer Leader, Elementary, Camp Roc n' Canoe (2015-Present)
(24) *Volunteer Leader, Sleep Out Saturday, Addressing Homelessness in Dupage County, (2015-Present)
(25) *Volunteer Leader, 30 hr Famine, Addressing Hunger and Poverty, (2015-Present)
(26) *Volunteer, Childrens Hunger Fund, Food Packing Events, (2013-Present)
(27) *Volunteer, Pacific Garden Mission, Chicago, (2013-Present)
(28) *STEM Workshop, Museum of Science and Industry, Chicago (2015-Present)
(29) *Park Forest Library Lecture (2014)
(30) *Guest Lecture, 5th grade class, Prairieview Elementary, (2014)
(31) **Advisory Board - Nanotechnology Law & Business, (2005-Present)
(32) **AVS Program Committee, (2008-Present)
(33) **AVS Thin Film's Division Program Committee, (2008-Present)
(34) *Guest Lecturer, Northwestern Materials Science Dept. MSE376, (2015-Present)
(35) **Interdisciplinary Consortium for Research and Educational Access in Science and Engineering (INCREASE) Workshop STM Lecture, (2015)
(36) *Argonne's Mentoring Exchange, select member of pilot group, (2014-Present)
(37) *Department of Educational Programs, Argonne, Student Research Participation Program, (2014)
(38) *Session Organizer, Argonne User Science Meeting, ANL, (2012)
(39) **Chair Thin Films Division, AVS, (2012)
(40) **Division Chair Elect, Thin Films Division AVS (2010-2011)
(41) **Organizing Committee, IEEE Nano – Birmingham, UK (2012)
(42) **Chair Student Chapters, AVS, (2010-2012)
(43) **Program Chair, Thin Films Division, AVS, (2008-2011)
(44) *Northwestern Young Alumni Committee (Materials Science) (2009-2011)
(45) *Department of Educational Programs, STM Course, Argonne (2010)
(46) **Guest Editor - MRS Bulletin, (2009-2010)

(47) **Topic Chair, Graphene Topical Conference, AVS Symposium, (2008-2010)

Highlight Publications

Refereed Journal Articles (*****indicates invited article, **+**indicates cover article)

(2 Science, 6 Nature Family, 4 Nano Letters, 1 PNAS … over 2300 citations combined)

*[1] "Borophene as a prototype for synthetic 2D materials development" A. J. Mannix, Z. Zhang, **N. P. Guisinger**, B. I. Yakobson, and M. C. Hersam, *Nat. Nanotech.* **13**, 444-450 (2018).

*+[1] "Synthesis and chemistry of elemental 2D materials" A. J. Mannix, B. Kiraly, M. C. Hersam, and **N. P. Guisinger**, *Nature Rev. Chem.* **1**, 0014 (2017).

[2] "Synthesis of borophenes, anisotropic, two-dimensional boron polymorphs" A. J. Mannix, X.-F. Zhou, B. Kiraly, J. D. Wood, D. Alducin, B. D. Myers, X. Liu, B. L. Fisher, U. Santiago, J. R. Guest, M. J. Yacaman, A. Ponce, A. R. Oganov, M. C. Hersam, **N. P. Guisinger**, *Science* **350**, 1513-1516 (2015).

[3] "Direct oriented growth of armchair graphene nanoribbons on germanium" R. M. Jacobberger, B. Kiraly, M. Fortin-Deschenes, P. L. Levesque, K. M . McElhinny, G. J. Brady, R. R. Delgado, S. S. Roy, A. Mannix, M. G. Lagally, P. G. Evans, P. Desjardins, R. Martel, M. C. Hersam, **N. P. Guisinger**, M. S. Arnold, *Nat. Comm.* **6**, 8006 (2015).

[4] "Solid-source growth and atomic-scale characterization of graphene on Ag(111)" B. Kiraly, E. V. Iski, A. J. Mannix, M. C. Hersam, and **N. P. Guisinger**, *Nat. Comm.* **4,** 2804 (2013).

[5] "Visualizing short-range charge transfer at interfaces between ferromagnetic and superconducting oxides" T.-Y. Chien, L. F. Kourkoutis, J. Chakhalian, B. Gray, M. Kareev, **N. P. Guisinger**, D. A. Muller, and J. W. Freeland, *Nat. Comm.* **4,** 2336 (2013).

+[6] "Control and characterization of individual grains and grain boundaries in graphene grown by chemical vapour deposition" Y. Qinkai, L. A. Jauregui, W. Wu, R. Colby, J. Tian, Z. Su, H. Cao, Z. Liu, D. Pandey, D. Wei, T. F. Chung, P. Peng, **N. P. Guisinger**, E. A. Stach, J. Bao, S.-S. Pei, and Y. P. Chen, *Nature Materials*, **10**, 443 (2011).

[7] "Epitaxial graphene on Cu(111)" L. Gao, J. R. Guest, and **N. P. Guisinger**, *Nano Lett.*, **10**, 3512 (2010).

[8] "Patterning graphene at the nanometer scale via hydrogen desorption" P. Sessi, J. R. Guest, M. Bode, and **N. P. Guisinger**, *Nano Lett*., **9**, 4343 (2009).

[9] "Exposure of epitaxial graphene grown on 6H-SiC(0001) to atomic hydrogen" **N. P. Guisinger**, G. M. Rutter, J. N. Crain, P. N. First, and J. A. Stroscio, *Nano Letters* **9**, 1462 (2009).

[10] “Interference and localization in epitaxial graphene” G. M. Rutter, J. N. Crain, **N. P. Guisinger**, T. Li, P. N. First and J. A. Stroscio, *Science*, **317**, 219 (2007).

⁺[11] “Probing charge transport at the single molecule level on silicon using cryogenic ultra-high vacuum scanning tunneling microscopy” **N. P. Guisinger**, N. L. Yoder, and M. C. Hersam, *Proc. Nat. Acad. Sci. USA*, **102**, 8838 (2005).

⁺[12] “Room temperature negative differential resistance through individual molecules on silicon surfaces” **N. P. Guisinger**, M. E. Greene, R. Basu, A. S. Baluch and M. C. Hersam, *Nano Letters*, **4**, 55 (2004).

Invention Disclosures

1. ANL-IN-07-098, Graphene as a transparent conductor, (2007)
2. ANL- IN-15-140, Borophenes, (2016)

Professional Societies and Affiliations

1. American Vacuum Society (Member)
2. American Physical Society (Member)
3. Northwestern Argonne Institute of Science and Engineering (Fellow)

Publications

Refereed Journal Articles (*****indicates invited article, ⁺indicates cover article) (Note: over 50% in DOE NSRC “High Impact” journals)

*[68] “Borophene as a prototype for synthetic 2D materials development” A. J. Mannix, Z. Zhang, **N. P. Guisinger**, B. I. Yakobson, and M. C. Hersam, *Nat. Nanotech.* **13**, 444-450 (2018).

[67] “Epitaxial graphene-encapsulated surface reconstruction of Ge(110)” G. P. Campbell, *et al. Phys. Rev. Mat.* **2**, 044004 (2018).

[66] “Resolving the chemically discrete structure of synthetic borophene polymorphs” G. P. Campbell, *et al*., *Nano Lett.* **18**, 2816-2821 (2018).

[65] “Atomically manufactured nickel-silicon quantum dots displaying robust resonant tunneling and negative differential resistance” J. Y. Cheng, B. L. Fisher, **N. P. Guisinger**, and C. M. Lilley, *NPJ Quant. Mat.* **2**, 25 (2017).

[64] “Growth of Pd nanoclusters on single-layer graphene on Cu(111)” E. Soy, **N. P. Guisinger**, and M. Trenary, *J. Phys. Chem. B* **122**, 572-577 (2017).

[63] “Self-assembly of electronically abrupt borophene/organic lateral heterostructures” X. Liu, Z. Wei, I. Balla, A. J. Mannix, **N. P. Guisinger**, E. Luijten, Mark C. Hersam, *Science Adv.* 3, e1602356 (2017).

*+[62] “Synthesis and chemistry of elemental 2D materials” A. J. Mannix, B. Kiraly, M. C. Hersam, and **N. P. Guisinger**, *Nature Rev. Chem.* **1**, 0014 (2017).

[61] “Substrate-Induced Nanoscale Undulations of Borophene on Silver” Z. Zhang, A. J. Mannix, Z. Hu, B. Kiraly, **N. P. Guisinger**, M. C. Hersam, and B. I. Yakobson, *Nano Lett.* **16**, 6622-6627 (2016).

[60] “Landau level splitting in nitrogen-seeded epitaxial graphene” S. L. Rothwell, F. Wang, G. Liu, C. Xu, L. C. Feldman, E. H. Conrad, **N. P. Guisinger**, P. I. Cohen, *Carbon* **103**, 299-304 (2016).

[59] “Sub-5 nm, globally aligned graphene nanoribbons on Ge(001)” B. Kiraly, A. J. Mannix, R. M. Jacobberger, B. L. Fisher, M. S. Arnold, M. C. Hersam and **N. P. Guisinger**, *Appl. Phys. Lett.* **108**, 213101 (2016).

[58] “Large Spatially Resolved Rectification in a Donor–Acceptor Molecular Heterojunction” J. A. Smerdon, N. C. Giebink, **N. P. Guisinger**, P. Darancet, and J. R. Guest, *Nano Lett.* **16**, 2603-2607 (2016).

[57] “Current-driven hydrogen desorption from graphene: experiment and theory” L. Gao, P. P. Pal, T. Seideman, **N. P. Guisinger**, and J. R. Guest, *J. Phys. Chem. Lett.* **7**, 486-494 (2016).

[56] “Built-in electric field induced mechanical property change at the lanthanum nickelate / Nb-doped strontium titanate interfaces” T. Y. Chien, J. Liu, A. J. Yost, J. Chakhalian, J. W. Freeland, and **N. P. Guisinger**, *Sci. Rep.* **6**, 19017 (2016).

[55] “Synthesis of borophenes, anisotropic, two-dimensional boron polymorphs” A. J. Mannix, X.- F. Zhou, B. Kiraly, J. D. Wood, D. Alducin, B. D. Myers, X. Liu, B. L. Fisher, U. Santiago, J. R. Guest, M. J. Yacaman, A. Ponce, A. R. Oganov, M. C. Hersam, **N. P. Guisinger**, *Science* **350**, 1513-1516 (2015).

[54] “Electronic and mechanical properties of graphene-germanium interfaces grown by chemical vapor deposition” B. Kiraly, R. M. Jacobberger, A. J. Mannix, G. P. Campbell, M. J. Bedzyk, M. S. Arnold, M. C. Hersam, and N. P. Guisinger, *Nano Lett.* **15**, 7414-7420 (2015).

[53] “L-tryptophan on Cu(111): engineering a molecular labrynth based on indole groups” E. N. Yitamben, A. Clayborne, S. B. Darling, and N. P. Guisinger, *Nanotech.* **26**, 235604 (2015).

[52] “Graphene-silicon heterostructures at the two-dimensional limit” B. Kiraly, A. J. Mannix, M. C. Hersam, and **N. P. Guisinger**, *Chem. Mat.* **27**, 6085-6090 (2015).

[51] “Direct oriented growth of armchair graphene nanoribbons on germanium” R. M. Jacobberger, B. Kiraly, M. Fortin-Deschenes, P. L. Levesque, K. M . McElhinny, G. J. Brady, R. R. Delgado, S. S. Roy, A. Mannix, M. G. Lagally, P. G. Evans, P. Desjardins, R. Martel, M. C. Hersam, **N. P. Guisinger**, M. S. Arnold, *Nat. Comm.* **6**, 8006 (2015).

[50] “Synthesis of palladium nanoparticles on TiO_2 (110) using a beta-diketonate precursor” Y. Lei, B. Liu, J. Lu, L. Gao, **N. P. Guisinger**, J. P. Greeley, J. W. Elam, *Phys. Chem. Chem. Phys.* **17**, 6470-6477 (2015).

[49] “First-principles predictions and *in situ* experimental validation of alumina atomic layer deposition on metal surfaces” J. Lu, B. Liu, **N. P. Guisinger**, P. C. Stair, J. P. Greeley, and J.W. Elam, *Chem. Mat.* **26**, 6752-6761 (2014).

[48] “Silicon growth at the two-dimensional limit on Ag(111)” A. J. Mannix, B. Kiraly, B. L. Fisher, M. C. Hersam, and **N. P. Guisinger**, *ACS Nano*. **8**, 7538-7547 (2014).

[47] “Solid-source growth and atomic-scale characterization of graphene on Ag(111)” B. Kiraly, E. V. Iski, A. J. Mannix, M. C. Hersam, and **N. P. Guisinger**, *Nat. Comm.* **4,** 2804 (2013).

[46] “Visualizing short-range charge transfer at interfaces between ferromagnetic and superconducting oxides” T.-Y. Chien, L. F. Kourkoutis, J. Chakhalian, B. Gray, M. Kareev, **N. P. Guisinger**, D. A. Muller, and J. W. Freeland, *Nat. Comm.* **4,** 2336 (2013).

[45] “Graphene at the atomic-scale: synthesis, characterization, and modification” E. V. Iski, E. N. Yitamben, L. Gao, and **N. P. Guisinger**, *Adv. Fun. Mat.* **23,** 2554-2564 (2013).

[44] “Cross-sectional scanning tunneling microscopy applied to complex oxide interfaces” T.- Y. Chien, J. Chakhalian, J. W. Freeland, and **N. P. Guisinger**, *Adv. Fun. Mat.* **23,** 2565-2575 (2013).

[43] “Chiral “pinwheel” heterojunctions self-assembled from C-60 and pentacene” J. A. Smerdon, R. B. Rankin, J. P. Greeley, **N. P. Guisinger**, and J. R. Guest, *ACS Nano* **7**, 3086-3094 (2013).

[42] “Tracking amino acids in chiral quantum corrals” E. N. Yitamben, L. Niebergall, R. B. Rankin, E. V. Iski, R. A. Rosenberg, J. P. Greeley, V. S. Stepanyuk, and **N. P. Guisinger**, *J. Phys. Chem. C* **117**, 11757-11763 (2013).

[41] “Atomic-scale investigation of highly stable Pt clusters synthesized on a graphene support for catalytic applications” E. Cho, E. N. Yitamben, E. V. Iski, **N. P. Guisinger**, and T. F. Kuech, *J. Phys. Chem. C* **116**, 26066-26071 (2012).

[40] “Spectroscopic evidence for spin-polarized edge states in graphitic Si nanowires” P. C. Snijders, P. S. Johnson, **N. P. Guisinger**, S. C. Erwin, and F. J. Himpsel, *New J. Phys.* **14,** 103004 (2012).

[39] “Study of Nb epitaxial growth on Cu(111) at sub-monolayer level” C. Clavero, **N. P. Guisinger**, S. G. Srinivasan, and R. A. Lukaszew, *J. Appl. Phys.* **112**, 074328 (2012).

[38] “Graphene induced surface reconstruction of Cu” J. Tian, H. Cao, W. Wu, Q. K. Yu, **N. P. Guisinger**, and Y. P. Chen, *Nano Lett.* **12**, 3893-3899 (2012).

[37] “Structural and electronic decoupling of C-60 from epitaxial graphene on SiC” J. Cho, J. Smerdon, L. Gao, O. Suzer, J. R. Guest, and **N. P. Guisinger**, *Nano Lett.* **12**, 3018-3024 (2012).

[36] “Morphology control of Fe films using ordered termination on $SrTiO_3$ surfaces” T. Y. Chien, J. W. Freeland, and **N. P. Guisinger**, *Appl. Phys. Lett.*, **100**, 031601 (2012).

[35] “Monolayer and bilayer pentacene on Cu(111)” J. A. Smerdon, M. Bode, **N. P. Guisinger**, and J. R. Guest, *Phys. Rev. B*, **84**, 165436 (2011).

[34] “Atomic-scale investigation of graphene grown on Cu foil and the effects of thermal annealing” J. Cho, L. Gao, J. Tian, H. Cao, W. Wu, Q. Yu, J. R. Guest, Y. P. Chen, and **N. P. Guisinger**, *ACS Nano*, **5**, 3607 (2011).

[+][33] “Control and characterization of individual grains and grain boundaries in graphene grown by chemical vapour deposition” Y. Qinkai, L. A. Jauregui, W. Wu, R. Colby, J. Tian, Z. Su, H. Cao, Z. Liu, D. Pandey, D. Wei, T. F. Chung, P. Peng, **N. P. Guisinger**, E. A. Stach, J. Bao, S.-S. Pei, and Y. P. Chen, *Nature Materials*, **10**, 443 (2011).

[32] “Epitaxial graphene on Cu(111)” L. Gao, J. R. Guest, and **N. P. Guisinger**, *Nano Lett.*, **10**, 3512 (2010).

[31] “Survey of fractured $SrTiO_3$ surfaces: from the micrometer to nanometer scale” T. Y. Chien, **N. P. Guisinger**, and J. W. Freeland, *J. Vac. Sci. Tech. B*, **28**, C5A11 (2010).

[30] “Visualizing nanoscale electronic band alignment at the $La_{2/3}Ca_{1/3}MnO_3$/Nb:$SrTiO_3$ interface” T. Y. Chien, J. A. Liu, J. Chakhalian, **N. P. Guisinger**, and J. W. Freeland, *Phys. Rev. B,* **82**, 041101 (2010).

[29] “Edge structure of epitaxial graphene islands” G. M. Rutter, **N. P. Guisinger**, J. N. Crain, P. N. First and J. A. Stroscio, *Phys. Rev. B*, **81**, 245408 (2010).

*****[+][28] “Beyond silicon: carbon-based nanotechnology” **N. P. Guisinger** and M. S. Arnold, *MRS Bulletin*, **35**, 273 (2010). **Note: Guest Editor**

[27] “Nanometer-scale striped surface terminations on fractured $SrTiO_3$ surfaces” **N. P. Guisinger**, T. S. Santos, J. R. Guest, T.-Y. Chien, A. Bhattacharya, J. W. Freeland, and M. Bode, *ACS Nano,* **12**, 4132 (2009).

[26] “Patterning graphene at the nanometer scale via hydrogen desorption” P. Sessi, J. R. Guest, M. Bode, and **N. P. Guisinger**, *Nano Lett*., **9**, 4343 (2009).

[25] “Controllable local modification of fractured Nb-doped $SrTiO_3$ surfaces” T. Y. Chien, T. S. Santos, M. Bode, **N. P. Guisinger**, and J. W. Freeland, *Appl. Phys. Lett*., **95**, 163107 (2009).

[24] “Temperature and Size Dependence of Antiferromagnetism in Mn Nanostructures” P. Sessi, **N. P. Guisinger**, J. R. Guest, and M. Bode, *Phys. Rev. Lett*., **103**, 167201 (2009).

[23] “Exposure of epitaxial graphene grown on 6H-SiC(0001) to atomic hydrogen” **N. P. Guisinger**, G. M. Rutter, J. N. Crain, P. N. First, and J. A. Stroscio, *Nano Letters* **9**, 1462 (2009).

[22] “Structural and electronic properties of bilayer epitaxial graphene” G. M. Rutter, J. N. Crain, **N. P. Guisinger**, P. N. First and J. A. Stroscio, *J. Vac. Sci. Tech. A*, **26,** 938 (2008).

[21] “The atomic-scale investigation of graphene formation on 6H-SiC(0001)” **N. P. Guisinger**, G. M. Rutter, J. N. Crain, C. Heiliger, P. N. First, and J. A. Stroscio, *J. Vac. Sci. Tech. A*, **26**, 932 (2008).

[20] “Subnanometer Imaging of Adsorbate-Induced Electronic Structure Perturbation on Silicon Surfaces”. **N. P. Guisinger**, N. L. Yoder, S. P. Elder, and M. C. Hersam, accepted, *J. Phys. Chem. C*, **112,** 2116 (2008).

[19] “Interface structure between graphene and SiC” G. M Rutter, **N. P. Guisinger**, J. N. Crain, E. A. A. Jarvis, M. D. Stiles, T. Li, P. N. First and J. A. Stroscio, *Phys. Rev. B,* **76,** 235416 (2007).

[18] “Interference and localization in epitaxial graphene” G. M. Rutter, J. N. Crain, **N. P. Guisinger**, T. Li, P. N. First and J. A. Stroscio, *Science*, **317**, 219 (2007).

*****[+][17] “Ultra-high vacuum scanning tunneling microscopy investigation of free radical adsorption to the Si(111)-7x7 surface” **N. P. Guisinger**, S. P. Elder, N. L. Yoder, and M. C. Hersam, *Nanotechnology*, **18**, 044011 (2007).

[16] “Quantifying desorption of saturated hydrocarbons from silicon with quantum calculations and scanning tunneling microscopy” N. L. Yoder, **N. P. Guisinger**, M. C. Hersam, R. Jorn, C.-C. Kaun, and T. Seideman, *Phys. Rev. Lett.*, **97**, 187601 (2006).

*****[15] “Molecular electronics: an overview of the current state of the science and the challenges that lie ahead” **N. P. Guisinger** and W. McConnell, *Nanotech. Law and Business*, **3**, Issue 1, (2006).

[+][14] “Probing charge transport at the single molecule level on silicon using cryogenic ultra-high vacuum scanning tunneling microscopy” **N. P. Guisinger**, N. L. Yoder, and M. C. Hersam, *Proc. Nat. Acad. Sci. USA*, **102**, 8838 (2005).

[13] “Negative differential resistance through individual organic molecules bound to the Si(111)-7×7 surface” A. S. Baluch, **N. P. Guisinger**, and M. C. Hersam, *TMS Lett.*, **1**, 125 (2004).

[12] “Cryogenic variable temperature ultra-high vacuum scanning tunneling microscope for single molecule studies on silicon surfaces” E. T. Foley, N. L. Yoder, **N. P. Guisinger**, and M. C. Hersam, *Rev. Sci. Instrum.*, **75**, 5280 (2004).

[+][11] “Room temperature nanofabrication of atomically registered heteromolecular organosilicon nanostructures using multi-step feedback controlled lithography” R. Basu, **N. P. Guisinger**, M. E. Greene, and M. C. Hersam, *Appl. Phys. Lett.*, **85**, 2619 (2004).

[+][10] “Room temperature negative differential resistance through individual molecules on silicon surfaces” **N. P. Guisinger**, M. E. Greene, R. Basu, A. S. Baluch and M. C. Hersam, *Nano Letters*, **4**, 55 (2004).

*****[+][9] “Observed suppression of room temperature negative differential resistance in organic monolayers on Si(100)” **N. P. Guisinger**, R. Basu, M. E. Greene, A. S. Baluch, and M. C. Hersam, *Nanotechnology*, **15**, S452 (2004).

[8] “Nitroxyl free radical binding to Si(100): A combined STM and computational modeling study” M. E. Greene, **N. P. Guisinger**, R. Basu, A. S. Baluch, and M. C. Hersam, *Surface Science*, **559**, 16 (2004).

[7] “Atomic-level robustness of the Si(100)-2x1:H surface following liquid phase chemical treatments in atmospheric pressure environments” A. S. Baluch, **N. P. Guisinger**, R. Basu, E. T. Foley, and M. C. Hersam, *J. Vac. Sci. Technol. A*, **22**, L1 (2004).

[6] “Molecular electronics on silicon: An ultra-high vacuum scanning tunneling microscopy study” **N. P. Guisinger**, R. Basu, A. S. Baluch, and M. C. Hersam, *Ann. N. Y. Acad. Sci.*, **1006**, 227 (2003).

[5] “Variable temperature study of the passivation of dangling bonds at Si(100)-2×1 reconstructed surfaces with H and D” M. C. Hersam, **N. P. Guisinger**, J. Lee, K. Cheng, and J. W. Lyding, *Appl. Phys. Lett.*, **80**, 201 (2002).

[4] “Atomic-level study of the robustness of the Si(100)-2×1:H surface following exposure to ambient conditions” M. C. Hersam, **N. P. Guisinger**, J. W. Lyding, D. S. Thompson, and J. S. Moore, *Appl. Phys. Lett.*, **78**, 886 (2001).

[3] “Implications of atomic-level manipulation on the Si(100) surface: From enhanced CMOS reliability to molecular nanoelectronics” M. C. Hersam, J. Lee, **N. P. Guisinger**, and J. W. Lyding, *Superlattices and Microstructures*, **27**, 583 (2000).

[2] “Silicon-based molecular nanotechnology” M. C. Hersam, **N. P. Guisinger**, and J. W. Lyding, *Nanotechnology*, **11**, 70 (2000).

[1] “Isolating, imaging, and electrically characterizing individual organic molecules on the Si(100) surface with the scanning tunneling microscope” M. C. Hersam, **N. P. Guisinger**, and J. W. Lyding, *J. Vac. Sci. Technol. A*, **18**, 1349 (2000).

Conference Proceedings

(*indicates invited paper)

[4] “Cross-sectional scanning tunneling microscopy of complex oxide interfaces” T. Y. Chien, **N. P. Guisinger**, and J. W. Freeland, *Proceedings of SPIE*, **7940**, 79400T (2011).

*****[3] “Characterization of silicon-based molecular resonant tunneling diodes with scanning tunneling microscopy” **N. P. Guisinger**, R. Basu, M. E. Greene, A. S. Baluch, and M. C. Hersam, *Proceedings of the 62nd Device Research Conference* (IEEE, New York, 2004), p. 195.

*****[2] “Nanoscale control of friction and chemistry on silicon surfaces” A. S. Baluch, R. Basu, **N. P. Guisinger**, C. R. Kinser, D. E. Kramer, M. W. Such, and M. C. Hersam, *Mat. Res. Soc. Symp. Proc.*, **750**, Y9.1.1 (2003).

*****[1] “Assessing the impact of fundamental scanning tunneling microscopy studies on VLSI technology” M. C. Hersam, **N. P. Guisinger**, and J. W. Lyding, *Proceedings of the 9th NASA Symposium on VLSI Design*, **1**, 5.1.1 (2000).

Presentations and Seminars

(* - indicates invited talk)

*[37] “Atomic-scale investigation of graphene and other 2D materials,” Presented orally by N. P. Guisinger at the EMN Fall Meeting, Las Vegas, NV (11/17/2015).

*[36] “Atomic-scale investigation of low-dimensional materials,” Presented orally by N. P. Guisinger at the University of Illinois-Chicago, Chicago, IL (10/12/2015).

*[35] “Scanning tunneling microscopy,” Presented orally by N. P. Guisinger at the INCREASE Workshop, Argonne National Laboratory, IL (09/18/2015).

[34] “Amino acid immobilization of surface diffusion on copper,” Presented orally by N. P. Guisinger at the 2015 APS Meeting, San Antonio, TX (March 2015).

[33] “Edge States and Exposure to Hydrogen of Silicon at the 2D Limit on Ag(111),” Presented orally by N. P. Guisinger at the 2014 AVS Meeting, Baltimore, MD (11/10/2014).

*[32] “Does silicene exist? Silicon at the 2D limit on Ag(111),” Presented orally by N. P. Guisinger at the Department of Physics, University of Giessen, Geissen-Germany (09/25/2014).

[31] “Solid-source growth and atomic scale characterization of graphene on Ag(111),” Presented orally by N. P. Guisinger at the NSS8, Chicago, IL (07/29/2014).

[30] “Exposure of silicene to atomic hydrogen,” Presented orally by N. P. Guisinger at the ICN+T, Vail, CO (07/23/2014).

*[29] “Atomic-scale investigations of 2D Group IV materials: Graphene and Silicene,” Presented orally by N. P. Guisinger at the Condensed Matter Seminar, Department of Physics, University of Notre Dame, South Bend, IN (03/20/2014).

*[28] “Current trends in scanning tunneling microscopy at Argonne National Laboratory,” Presented orally by N. P. Guisinger at the MSD Colloquia, Argonne National Laboratory, IL (08/16/2012).

*[27] “Graphene synthesis, characterization, and processing: an atomic-scale investigation,” Presented orally by N. P. Guisinger at the 2011 APS March Meeting, Atlanta, GA (3/24/2011).

*[26] “Graphene: synthesis, characterization and processing at the atomic-scale,” Presented orally by N. P. Guisinger at the Department of Energy – NSRC Contractor’s Meeting, Annapolis, MD (6/1/2011).

*[25] “Graphene: synthesis, characterization and modification,” Presented orally by N. P. Guisinger at the Department of Chemistry, Tufts University, Medford, MA (3/29/2011).

*[24] “Current trends in scanning probe microscopy at Argonne National Laboratory,” Presented orally by N. P. Guisinger at the Department of Electrical and Computer Engineering, University of Illinois Urbana-Champaign, IL (11/18/2010).

*[23] “Graphene: synthesis, characterization and modification,” Presented orally by N. P. Guisinger at the Workshop with Bar-Ilan University, Argonne National Laboratory, IL (10/12/2010).

*[22] “Graphene: synthesis, characterization and modification,” Presented orally by N. P. Guisinger at the Department of Energy – CNM Review, Argonne National Laboratory, IL (5/21/2010).

*[21] “Epitaxial Graphene: synthesis, characterization and modification,” Presented orally by N. P. Guisinger at the Department of Materials Science and Engineering, University of Wisconsin-Madison, WI (5/06/2010).

*[20] “Current trends in scanning probe microscopy at Argonne National Laboratory,” Presented orally by N. P. Guisinger at the Department of Physics, University of Alabama, Tuscaloosa, AL (4/29/2010).

*[19] “Epitaxial Graphene: synthesis, characterization and modification,” Presented orally by N. P. Guisinger at the Workshop on Opportunities for Magnetism in MEMS/NEMS, Argonne National Laboratory, IL (4/16/2010).

*[18] “Fundamentals of Graphene,” Presented orally by N. P. Guisinger at the M2D2 Workshop, Argonne National Laboratory, IL (2/24/2010).

*[17] “Current trends in scanning probe microscopy at Argonne National Laboratory,” Presented orally by N. P. Guisinger at the Department of Physics, Purdue University, IN (10/09/2009).

*[16] “Current trends in scanning probe microscopy at Argonne National Laboratory,” Presented orally by N. P. Guisinger at the Department of Electrical Engineering, University of Virginia, VA (3/12/2009).

[15] “Exposure of Epitaxial Graphene on SiC(0001) to Atomic Hydrogen,” Presented orally by N. P. Guisinger at the ICN+T, Keystone, CO (7/23/08).

[14] “Exposure of Epitaxial Graphene on SiC(0001) to Atomic Hydrogen,” Presented orally by N. P. Guisinger at the APS March Meeting, New Orleans, LA (3/12/08).

*[13] “The Characterization, Processing, and Application of Hybrid Organic/Inorganic Nanomaterials,” Presented orally by N. P. Guisinger at the Center for Nanoscale Materials, Argonne, IL (4/12/07).

[12] “Atomic-scale Characterization of Free Radical Adsorption to the Si(111)-7 x 7 Surface,” Presented orally by N. P. Guisinger at the APS March Meeting, Denver, CO (3/7/07).

*[11] “Silicon Based Molecular Electronics,” Presented orally by N. P. Guisinger at the ACS National Meeting, Atlanta, GA (3/28/06).

*[10] “Probing Organic Chemistry on Silicon Surfaces at the Single Molecule Level with UHV STM,” Presented orally by N. P. Guisinger at the Telluride Workshop on Functional Modification of Semiconductor Surfaces, Telluride, CO (8/2/06).

[9] “Probing Silicon Based Molecular Electronics with Ultrahigh Vacuum Scanning Tunneling Microscopy,” Presented orally by N. P. Guisinger at the AVS International Symposium, Boston, MA (11/04/05).

[8] “Probing Silicon Based Molecular Electronics with Ultrahigh Vacuum Scanning Tunneling Microscopy,” Presented orally by N. P. Guisinger at the Physical Electronics Conference, Madison, WI (6/21/05).

[7] “Silicon Based Molecular Electronics,” Presented orally by N. P. Guisinger at the Hilliard Symposium, Evanston, IL (5/12/05).

[6] “Room Temperature Negative Differential Resistance Measured through Molecular Monolayers Adsorbed to Silicon Surfaces with Ultra-high Vacuum Scanning Tunneling Microscopy,” Presented orally by N. P. Guisinger at the AVS International Symposium, Anaheim, CA (11/14/04).

[5] “Observation of Suppressed Negative Differential Resistance Measured through Molecular Monolayers Adsorbed to Silicon at Room Temperature,” Presented orally by N. P. Guisinger at the AVS Prairie Chapter Meeting, Urbana, IL (6/14/04).

[4] “Observation of negative differential resistance measured through individual molecules on silicon at room temperature,” Presented orally by N. P. Guisinger at the AVS International Symposium, Baltimore, MD (11/5/03).

[3] “Atomic-level characterization and control of free radical surface chemistry using scanning tunneling microscopy,” Presented orally by N. P. Guisinger at the American Vacuum Society Prairie Chapter 2002 Meeting, Chicago, IL (10/7/02).

[2] “Atomic level characterization and control of organosilicon surface chemistry using scanning tunneling microscopy,” Presented orally by N. P. Guisinger at the Center for Catalysis and Surface Science Annual Meeting, Evanston, IL (9/10/02).

[1] “Variable Temperature Study of Hydrogen and Deuterium Passivation of the Si(100)-2×1 Surface Using the Scanning Tunneling Microscope,” Presented orally by N. P. Guisinger at the American Vacuum Society (AVS) International Symposium, Boston, MA (10/2/00).

Sponsored Projects

FY 2016

1) DOE SISGR Contract No. DE-FG02-09ER16109, "Single Molecule Chemical Imaging at Femtosecond Time Scales" (Co-PI with Jeff Guest and Saw Hla) $580K
Total: $580K

FY 2015
1) DOE SISGR Contract No. DE-FG02-09ER16109, "Single Molecule Chemical Imaging at Femtosecond Time Scales" (Co-PI with Jeff Guest and Saw Hla) $580K
Total: $580K

FY 2014
2) DOE SISGR Contract No. DE-FG02-09ER16109, "Single Molecule Chemical Imaging at Femtosecond Time Scales" (Co-PI with Jeff Guest and Saw Hla) $580K
Total: $580K

FY 2013
3) DOE SISGR Contract No. DE-FG02-09ER16109, "Single Molecule Chemical Imaging at Femtosecond Time Scales" (Co-PI with Jeff Guest and Saw Hla) $580K
Total: $580K

FY 2012
4) DOE SISGR Contract No. DE-FG02-09ER16109, "Single Molecule Chemical Imaging at Femtosecond Time Scales" (Co-PI with Jeff Guest) $580K
Total: $580K

FY 2011
1) LDRD 2009-083-N0, “Local Probes of Novel Electronic States at Complex Oxide Interfaces” (Co-PI with John Freeland) $135K
2) LDRD 2009-204-N0, “Engineering Nanostructures Atom by Atom for Optical Activity and Quantum Coherence” (Co-PI with Jeff Guest) $120K
3) DOE SISGR Contract No. DE-FG02-09ER16109, "Single Molecule Chemical Imaging at Femtosecond Time Scales" (Co-PI with Jeff Guest) $600K
4) DARPA MIPR 10-E533, “Chemical Vapor Deposition (CVD) Graphene on Cu Foil: Synthesis, Characterization, Processing, Optimization” $300K
Total: $1.15M

FY 2010
1) LDRD 2009-083-N0, “Local Probes of Novel Electronic States at Complex Oxide Interfaces” (Co-PI with John Freeland) $135K
2) LDRD 2009-204-N0, “Engineering Nanostructures Atom by Atom for Optical Activity and Quantum Coherence” (Co-PI with Jeff Guest) $130K
3) DOE SISGR Contract No. DE-FG02-09ER16109, "Single Molecule Chemical Imaging at Femtosecond Time Scales" (Co-PI with Jeff Guest, Matthias) $400K
Total: $665K

FY 2009
1) **LDRD 2009-083-N0, “Local Probes of Novel Electronic States at Complex Oxide Interfaces” (Co-PI with John Freeland) $105K
2) LDRD 2009-204-N0, “Engineering Nanostructures Atom by Atom for Optical Activity and Quantum Coherence” (Co-PI with Jeff Guest) $125K
** Results of this project featured on cover of LDRD FY2009 annual report
Total: $230K