

PINSHANE Y. HUANG

ASSOCIATE PROFESSOR AND RACHEFF FACULTY SCHOLAR
MATERIALS SCIENCE AND ENGINEERING
UNIVERSITY OF ILLINOIS, URBANA-CHAMPAIGN

Phone: (217) 300-2574
E-mail: pyhuang@illinois.edu
Website: <https://huanglab.matse.illinois.edu/>

PROFESSIONAL APPOINTMENTS

2021-present	University of Illinois, Urbana-Champaign Associate Professor, Department of Materials Science and Engineering Affiliate Faculty, Materials Research Laboratory
2015-2021	University of Illinois, Urbana-Champaign Assistant Professor, Department of Materials Science and Engineering Affiliate Faculty, Materials Research Laboratory Affiliate Faculty, Beckman Institute
2014-2015	Postdoctoral Fellow, Columbia University, New York, NY
2008-2014	Graduate Research Assistant, Cornell University, Ithaca, NY

EDUCATION AND TRAINING

Carleton College	Northfield, MN	Physics	B.A.	2008
Cornell University	Ithaca, NY	Applied & Engineering Physics	M.S.	2012
Cornell University	Ithaca, NY	Applied & Engineering Physics	Ph.D.	2014
Columbia University	New York, NY	Chemistry	Post-doc	2014-2015

AWARDS AND HONORS

Scientific Honors and Awards:

2021	Campus Distinguished Promotion
2021	Dean's Award for Excellence in Research
2019	Presidential Early Career Award in Science and Engineering (PECASE)
2019	NSF CAREER award
2019	Kavli Fellow, National Academy of Sciences
2018	Highly Cited Researchers List, Clarivate Analytics
2018	Sloan Fellowship in Physics, Alfred P. Sloan Foundation
2018	Kavli Fellow, National Academy of Sciences
2018	Center for Advanced Study Fellow, University of Illinois
2017	Packard Fellowship, David & Lucile Packard Foundation
2017	3M Non-Tenured Faculty Award
2017	Albert Crewe Award, Microscopy Society of America
2016	Air Force Office of Scientific Research Young Investigator Award
2013	William Nichols Findley Award for Exceptional Research, Cornell University
2013	Best Paper Award, Microbeam Analysis Society
2012	Raymond Castaing Award, Microscopy Society of America
2012	Presidential Scholarship Award, Microscopy Society of America
2012	Best Poster, Glasses and Optical Materials Division conference
2010	Best Poster, Advanced Electron Microscopy Symposium, Rutgers University

2009 NSF Graduate Student Research Fellowship
2008 Center for Nanoscale Systems Fellowship, Cornell University
2008 Sigma Xi Grants in Aid of Research

Teaching Awards:

2023 Rose Award for Teaching Excellence
2021 Grainger College of Engineering Teaching Excellence Award
2018 Illinois Student Government Teaching Excellence Award
Multiple years *List of Teachers Ranked as Excellent by their Students*, University of Illinois

JOURNAL PUBLICATIONS (h-index 31, >17,000 citations)

(FULL LIST: <https://scholar.google.com/citations?user=VGnBXzMAAAAJ>)

- 1 Nguyen, K. X., Huang, J., Karigerasi, M. H., Kang, K., Cahill, D. G., Zuo, J.-M., Schleife, A., Shoemaker, D. P. & Huang, P. Y. Angstrom-scale imaging of magnetization in antiferromagnetic Fe₂As via 4D-STEM. *Ultramicroscopy* **247**, 113696 (2023).
- 2 Lee, C. H., Ryu, H., Nolan, G., Zhang, Y., Lee, Y., Oh, S., Cheong, H., Watanabe, K., Taniguchi, T., Kim, K., Lee, G. H. & Huang, P. Y. In Situ Imaging of an Anisotropic Layer-by-Layer Phase Transition in Few-Layer MoTe₂. *Nano Lett* **23**, 677-684 (2023).
- 3 Han, E., Nahid, S. M., Rakib, T., Nolan, G., Ferrari, P. F., Hossain, M. A., Schleife, A., Nam, S., Ertekin, E., van der Zande, A. M. & Huang, P. Y. Bend-Induced Ferroelectric Domain Walls in α -In₂Se₃. *ACS Nano* **17**, 7881-7888 (2023).
- 4 Yang, S.-J., Jung, J.-H., Lee, E., Han, E., Choi, M.-Y., Jung, D., Choi, S., Park, J.-H., Oh, D., Noh, S., Kim, K.-J., Huang, P. Y., Hwang, C.-C. & Kim, C.-J. Wafer-Scale Programmed Assembly of One-Atom-Thick Crystals. *Nano Letters* **22**, 1518-1524 (2022).
- 5 Yang, D., Andre, S., Dallas, T., Pinshane, H. & Cecilia, L. in *ASEE Annual Conference & Exposition* (ASEE Conferences, Minneapolis, MN, 2022).
- 6 Riedel, Z. W., Amerikheirabadi, F., Qu, K., Huang, J., Gebre, M. S., Bhutani, A., Haasch, R. T., Huang, P. Y., Schleife, A. & Shoemaker, D. P. Structure and Magnetic Properties of Ni₄V₃O₁₀, an Antiferromagnet with Three Types of Vanadium–Oxygen Polyhedra. *Chemistry of Materials* (2022).
- 7 Kharel, P., Janicek, B. E., Bae, S. h., Loutris, A. L., Carmichael, P. T. & Huang, P. Y. Atomic-Resolution Imaging of Small Organic Molecules on Graphene. *Nano Letters* **22**, 3628-3635 (2022).
- 8 Karigerasi, M. H., Kang, K., Huang, J., Peterson, V. K., Rule, K. C., Studer, A. J., Schleife, A., Huang, P. Y. & Shoemaker, D. P. High-resolution diffraction reveals magnetoelastic coupling and coherent phase separation in tetragonal CuMnAs. *Physical Review Materials* **6**, 094405 (2022).
- 9 Yu, J., Han, E., Hossain, M. A., Watanabe, K., Taniguchi, T., Ertekin, E., van der Zande, A. M. & Huang, P. Y. Designing the Bending Stiffness of 2D Material Heterostructures. *Adv Mater* **33**, e2007269 (2021).
- 10 Ryu, H., Lee, Y., Kim, H.-J., Kang, S.-H., Kang, Y., Kim, K., Kim, J., Janicek, B. E., Watanabe, K., Taniguchi, T., Huang, P. Y., Cheong, H., Jung, I.-H., Kim, K., Son, Y.-W. & Lee, G.-H. Anomalous Dimensionality-Driven Phase Transition of MoTe₂ in Van der Waals Heterostructure. *Advanced Functional Materials* **n/a**, 2107376 (2021).
- 11 Kang, S., Kim, Y. S., Jeong, J. H., Kwon, J., Kim, J. H., Jung, Y., Kim, J. C., Kim, B., Bae, S. H., Huang, P. Y., Hone, J. C., Jeong, H. Y., Park, J.-W., Lee, C.-H. & Lee, G.-H. Enhanced Photoluminescence of Multiple Two-Dimensional van der Waals Heterostructures Fabricated by Layer-by-Layer Oxidation of MoS₂. *ACS Applied Materials & Interfaces* **13**, 1245-1252 (2021).
- 12 Kang, K., Goodman, M. D., Krogstad, J. A., Leal, C., Trinkle, D. R., Huang, P. Y., and Schleife, A. in *2021 ASEE Virtual Annual Conference*
- 13 Chen, D., Zheng, Y., Lee, C.-H., Kang, S., Zhu, W., Zhuang, H., Huang, P. Y. & Jiao, Y. Nearly hyperuniform, nonhyperuniform, and antihyperuniform density fluctuations in two-dimensional transition metal dichalcogenides with defects. *Physical Review B* **103**, 224102 (2021).

- 14 Li, Q., Shang, X., Janicek, B., Huang, P. Y., Bellon, P. & Averback, R. S. Evolution of Nb oxide nanoprecipitates in Cu during reactive mechanical alloying. *Journal of Materials Research* **35**, 98-111 (2020).
- 15 Lee, C. H., Khan, A., Luo, D., Santos, T. P., Shi, C., Janicek, B. E., Kang, S., Zhu, W., Sobh, N. A., Schleife, A., Clark, B. K. & Huang, P. Y. Deep Learning Enabled Strain Mapping of Single-Atom Defects in Two-Dimensional Transition Metal Dichalcogenides with Sub-Picometer Precision. *Nano Letters* **20**, 3369-3377 (2020).
- 16 Kim, S., Annevelink, E., Han, E., Yu, J., Huang, P. Y., Ertekin, E. & van der Zande, A. M. Stochastic Stress Jumps Due to Soliton Dynamics in Two-Dimensional van der Waals Interfaces. *Nano Letters* **20**, 1201-1207 (2020).
- 17 Han, E., Yu, J., Annevelink, E., Son, J., Kang, D. A., Watanabe, K., Taniguchi, T., Ertekin, E., Huang, P. Y. & van der Zande, A. M. Ultrasoft slip-mediated bending in few-layer graphene. *Nat Mater* **19**, 305-309 (2020).
- 18 Grace, M. L., Dallas, R. T., Andre, S., Cecilia, L., Jessica, K., Robert, M., Pascal, B., Pinshane, Y. H., Nicola, H. P., Matthew, W., Timothy, B. & Geoffrey, L. H. (ASEE Conferences).
- 19 Al-Zoubi, T., Zhou, Y., Yin, X., Janicek, B. E., Sun, C.-J., Schulz, C. E., Zhang, X., Gewirth, A. A., Huang, P. Y., Zelenay, P. & Yang, H. Preparation of Non-precious Metal Electrocatalysts for the Reduction of Oxygen Using a Low-Temperature Sacrificial Metal. *Journal of the American Chemical Society* **142**, 5477-5481 (2020).
- 20 Janicek, B. E., Hinman, J. G., Hinman, J. J., Bae, S. H., Wu, M., Turner, J., Chang, H. H., Park, E., Lawless, R., Suslick, K. S., Murphy, C. J. & Huang, P. Y. Quantitative Imaging of Organic Ligand Density on Anisotropic Inorganic Nanocrystals. *Nano Lett* **19**, 6308-6314 (2019).
- 21 Hinman, J. G., Hinman, J. J., Janicek, B. E., Huang, P. Y., Suslick, K. S. & Murphy, C. J. Ultrasonic Nebulization for TEM Sample Preparation on Single-Layer Graphene Grids. *Nano Letters* **19**, 1938-1943 (2019).
- 22 Finley, J., Lee, C. H., Huang, P. Y. & Liu, L. Spin-Orbit Torque Switching in a Nearly Compensated Heusler Ferrimagnet. *Advanced Materials* **31**, 1-6 (2019).
- 23 Zheng, Q., Li, S., Li, C., Lv, Y., Liu, X., Huang, P. Y., Broido, D. A., Lv, B. & Cahill, D. G. High Thermal Conductivity in Isotopically Enriched Cubic Boron Phosphide. *Advanced Functional Materials* **28**, 1805116-1805116 (2018).
- 24 Zhang, Y., Heiranian, M., Janicek, B., Budrikis, Z., Zapperi, S., Huang, P. Y., Johnson, H. T., Aluru, N. R., Lyding, J. W. & Mason, N. Strain Modulation of Graphene by Nanoscale Substrate Curvatures: A Molecular View. *Nano Letters* **18**, 2098-2104 (2018).
- 25 Tian, F., Song, B., Chen, X., Ravichandran, N. K., Lv, Y., Ding, Z., Sun, J., Amila, G., Udalamatta, G., Sun, H., Chen, S., Chu, C.-w., Huang, P. Y., Broido, D. & Shi, L. Unusual high thermal conductivity in boron arsenide bulk crystals. *Science* **585**, 582-585 (2018).
- 26 Son, J., Kwon, J., Kim, S., Lv, Y., Yu, J., Lee, J.-Y., Ryu, H., Watanabe, K., Taniguchi, T., Garrido-Menacho, R., Mason, N., Ertekin, E., Huang, P. Y., Lee, G.-H. & M. van der Zande, A. Atomically precise graphene etch stops for three dimensional integrated systems from two dimensional material heterostructures. *Nature Communications* **9**, 3988-3988 (2018).
- 27 Li, S., Zheng, Q., Lv, Y., Liu, X., Wang, X., Huang, P. Y., Cahill, D. G. & Lv, B. High thermal conductivity in cubic boron arsenide crystals. *Science* **361**, 579-581 (2018).
- 28 Gill, S. T., Damasco, J., Janicek, B. E., Durkin, M. S., Humbert, V., Gazibegovic, S., Car, D., Bakkers, E., Huang, P. Y. & Mason, N. Selective-Area Superconductor Epitaxy to Ballistic Semiconductor Nanowires. *Nano Lett* **18**, 6121-6128 (2018).
- 29 Rhodes, D., Chenet, D. A., Janicek, B. E., Nyby, C., Lin, Y., Jin, W., Edelberg, D., Mannebach, E., Finney, N., Antony, A., Schiros, T., Klarr, T., Mazzoni, A., Chin, M., Chiu, Y. C., Zheng, W., Zhang, Q. R., Ernst, F., Dadap, J. I., Tong, X., Ma, J., Lou, R., Wang, S., Qian, T., Ding, H., Osgood, R. M., Jr., Paley, D. W., Lindenber, A. M., Huang, P. Y., Pasupathy, A. N., Dubey, M., Hone, J. & Balicas, L. Engineering the Structural and Electronic Phases of MoTe₂ through W Substitution. *Nano Lett* **17**, 1616-1622 (2017).

- 30 Raja, A., Montoya Castillo, A., Zultak, J., Zhang, X. X., Ye, Z., Roquelet, C., Chenet, D. A., van der Zande, A. M., Huang, P., Jockusch, S., Hone, J., Reichman, D. R., Brus, L. E. & Heinz, T. F. Energy Transfer from Quantum Dots to Graphene and MoS₂: The Role of Absorption and Screening in Two-Dimensional Materials. *Nano Lett* **16**, 2328-2333 (2016).
- 31 Kang, K., Xie, S., Huang, L., Han, Y., Huang, P. Y., Mak, K. F., Kim, C. J., Muller, D. & Park, J. High-mobility three-atom-thick semiconducting films with wafer-scale homogeneity. *Nature* **520**, 656-660 (2015).
- 32 David, S. N., Zhai, Y., Van Der Zande, A. M., O'Brien, K., Huang, P. Y., Chenet, D. A., Hone, J. C., Zhang, X. & Yin, X. Rapid, all-optical crystal orientation imaging of two-dimensional transition metal dichalcogenide monolayers. *Applied Physics Letters* **107** (2015).
- 33 Cui, X., Lee, G.-H., Kim, Y. D., Arefe, G., Huang, P. Y., Lee, C.-H., Chenet, D. A., Zhang, X., Wang, L., Ye, F., Pizzocchero, F., Jessen, B. S., Watanabe, K., Taniguchi, T., Muller, D. A., Low, T., Kim, P. & Hone, J. Multi-terminal transport measurements of MoS₂ using a van der Waals heterostructure device platform. *Nature Nanotechnology* **10**, 534-540 (2015).
- 34 Chenet, D. A., Aslan, O. B., Huang, P. Y., Fan, C., van der Zande, A. M., Heinz, T. F. & Hone, J. C. In-Plane Anisotropy in Mono- and Few-Layer ReS₂ Probed by Raman Spectroscopy and Scanning Transmission Electron Microscopy. *Nano Letters* **15**, 5667-5672 (2015).
- 35 Bles, M. K., Barnard, A. W., Rose, P. A., Roberts, S. P., McGill, K. L., Huang, P. Y., Ruyack, A. R., Kevek, J. W., Kobrin, B., Muller, D. A. & McEuen, P. L. Graphene kirigami. *Nature* **524**, 204-207 (2015).
- 36 Van Der Zande, A. M., Kunstmann, J., Chernikov, A., Chenet, D. A., You, Y., Zhang, X., Huang, P. Y., Berkelbach, T. C., Wang, L., Zhang, F., Hybertsen, M. S., Muller, D. A., Reichman, D. R., Heinz, T. F. & Hone, J. C. Tailoring the electronic structure in bilayer molybdenum disulfide via interlayer twist. *Nano Letters* **14**, 3869-3875 (2014).
- 37 Wang, L., Meric, I., Huang, P. Y., Gao, Q., Gao, Y., Tran, H., Taniguchi, T., Watanabe, K., Campos, L. M., Muller, D. A., Guo, J., Kim, P., Hone, J., Shepard, K. L. & Dean, C. R. One-dimensional electrical contact to a two-dimensional material. *Science* **342**, 614-617 (2013).
- 38 Van Der Zande, A. M., Huang, P. Y., Chenet, D. A., Berkelbach, T. C., You, Y., Lee, G. H., Heinz, T. F., Reichman, D. R., Muller, D. A. & Hone, J. C. Grains and grain boundaries in highly crystalline monolayer molybdenum disulfide. *Nature Materials* **12**, 554-561 (2013).
- 39 Huang, P. Y., Kurasch, S., Alden, J. S., Shekhawat, A., Alemi, A. A., McEuen, P. L., Sethna, J. P., Kaiser, U. & Muller, D. A. Imaging atomic rearrangements in two-dimensional silica glass: Watching silica's dance. *Science* **342**, 224-227 (2013).
- 40 Alden, J. S., Tsen, A. W., Huang, P. Y., Hovden, R., Brown, L., Park, J., Muller, D. A. & McEuen, P. L. Strain solitons and topological defects in bilayer graphene. *Proceedings of the National Academy of Sciences* **110**, 11256-11260 (2013).
- 41 Wang, L., Travis, J. J., Cavanagh, A. S., Liu, X., Koenig, S. P., Huang, P. Y., George, S. M. & Bunch, J. S. Ultrathin oxide films by atomic layer deposition on graphene. *Nano Letters* **12**, 3706-3710 (2012).
- 42 Petrone, N., Dean, C. R., Meric, I., Van Der Zande, A. M., Huang, P. Y., Wang, L., Muller, D., Shepard, K. L. & Hone, J. Chemical vapor deposition-derived graphene with electrical performance of exfoliated graphene. *Nano Letters* **12**, 2751-2756 (2012).
- 43 Levendorf, M. P., Kim, C. J., Brown, L., Huang, P. Y., Havener, R. W., Muller, D. A. & Park, J. Graphene and boron nitride lateral heterostructures for atomically thin circuitry. *Nature* **488**, 627-632 (2012).
- 44 Huang, P. Y., Meyer, J. C. & Muller, D. A. From atoms to grains: Transmission electron microscopy of graphene. *MRS Bulletin* **37**, 1214-1221 (2012).
- 45 Huang, P. Y., Kurasch, S., Srivastava, A., Skakalova, V., Kotakoski, J., Krasheninnikov, A. V., Hovden, R., Mao, Q., Meyer, J. C., Smet, J., Muller, D. A. & Kaiser, U. Direct imaging of a two-dimensional silica glass on graphene. *Nano Letters* **12**, 1081-1086 (2012).
- 46 Brown, L., Hovden, R., Huang, P., Wojcik, M., Muller, D. A. & Park, J. Twinning and twisting of tri- and bilayer graphene. *Nano Letters* **12**, 1609-1615 (2012).

- 47 Ruiz-Vargas, C. S., Zhuang, H. L., Huang, P. Y., Van Der Zande, A. M., Garg, S., McEuen, P. L., Muller, D. A., Hennig, R. G. & Park, J. Softened elastic response and unzipping in chemical vapor deposition graphene membranes. *Nano Letters* **11**, 2259-2263 (2011).
- 48 Huang, P. Y., Ruiz-Vargas, C. S., Van Der Zande, A. M., Whitney, W. S., Levendoff, M. P., Kevek, J. W., Garg, S., Alden, J. S., Hustedt, C. J., Zhu, Y., Park, J., McEuen, P. L. & Muller, D. A. Grains and grain boundaries in single-layer graphene atomic patchwork quilts. *Nature* **469**, 389-392 (2011).
- 49 Moriyama, T., Gudmundsen, T. J., Huang, P. Y., Liu, L., Muller, D. A., Ralph, D. C. & Buhrman, R. A. Tunnel magnetoresistance and spin torque switching in MgO-based magnetic tunnel junctions with a Co/Ni multilayer electrode. *Applied Physics Letters* **97**, 072513 (2010).
- 50 Read, J. C., Cha, J. J., Egelhoff, W. F., Tseng, H. W., Huang, P. Y., Li, Y., Muller, D. A. & Buhrman, R. A. High magnetoresistance tunnel junctions with Mg-B-O barriers and Ni-Fe-B free electrodes. *Applied Physics Letters* **94**, 112504 (2009).
- 51 Cha, J. J., Read, J. C., Egelhoff, W. F., Huang, P. Y., Tseng, H. W., Li, Y., Buhrman, R. A. & Muller, D. A. Atomic-scale spectroscopic imaging of CoFeB/Mg-B-O/CoFeB magnetic tunnel junctions. *Applied Physics Letters* **95**, 032506 (2009).