**Name:** Ondrej Dyck **Position Title:** Electron Microscopist

Phone: (336) 262-7228 Center for Nanophase Materials Sciences

E-mail: dyckoe@ornl.gov Oak Ridge National Laboratory

1 Bethel Valley Rd., Oak Ridge, TN 37831

**Education**:

University of Tennessee, Knoxville Ph.D. 2015 Materials Science and Engineering

Appalachian State University *Summa Cum Laude* 2011 Math and Physics

**Professional Activities, Honors, Awards:**

American Vacuum Society International Symposium & Exhibition 65 Focus Topic Co-chair (2017-2018)

Best MSE poster, AREMS conference (2012)

Best MSE poster, AREMS conference (2011)

Phi Theta Kappa

Sigma Pi Sigma

Special Recognition (for physics seniors at Appalachian State University)

Walter C. Connolly-Physics Award (outstanding performance in the intermediate physics classes)

Earnest F. Hollings Scholarship Award (from NOAA)

NSF sponsored S-STEM Scholarship Program

**Professional Memberships:**

Microscopy Society of America

Materials Research Society

American Vacuum Society

**Peer-Reviewed Publications:**

**2019**

Maksov A, Dyck O, Wang K, Xiao K, Geohegan DB, Sumpter BG, Vasudevan RK, Jesse S, Kalinin SV and Ziatdinov M. Deep learning analysis of defect and phase evolution during electron beam-induced transformations in WS2. npj Computational Materials, 2019

Li X, Dyck O, Oxley MP, Lupini AR, McInnes L, Healy J, Jesse S and Kalinin SV. Manifold learning of four-dimensional scanning transmission electron microscopy. npj Computational Materials, 2019

Tian M, Dyck O, Ge J and Duscher G. Measuring the areal density of nanomaterials by electron energy-loss spectroscopy. Ultramicroscopy, 2019

**2018**

Orozco DC, Dyck O, Papandrew AB, Zawodzinski TA. A parametric study of the solid acid fuel cell cathode. Journal of Power Sources. 2018

Dyck O, Kim S, Jimenez-Izal E, Alexandrova AN, Kalinin SV, Jesse S. Building Structures Atom-by-Atom via Electron Beam Manipulation. Small, 2018

Rama K Vasudevan, Nouamane Laanait, Erik M Ferragut, Kai Wang, David B Geohegan, Kai Xiao, Maxim A Ziatdinov, Stephen Jesse, Ondrej E Dyck, Sergei V Kalinin. Mapping mesoscopic phase evolution during e-beam induced transformations via deep learning of atomically resolved images. npj Computational Materials, 2018

Ondrej Dyck, Songkil Kim, Sergei V. Kalinin, Stephen Jesse. E-beam manipulation of Si atoms on graphene edges with an aberration-corrected scanning transmission electron microscope. Nano Research, 2018

Songkil Kim, Ondrej Dyck, Anton V Ievlev, Ivan V Vlassiouk, Sergei V Kalinin, Alex Belianinov, Stephen Jesse, Olga S Ovchinnikova. Graphene milling dynamics during helium ion beam irradiation. Carbon, 2018

Songkil Kim, Anton V Ievlev, Jacek Jakowski, Ivan V Vlassiouk, Xiahan Sang, Chance Brown, Ondrej Dyck, Raymond R Unocic, Sergei V Kalinin, Alex Belianinov, Bobby G Sumpter, Stephen Jesse, Olga S Ovchinnikova. Multi-purposed Ar gas cluster ion beam processing for graphene engineering. Carbon, 2018

Dyck O, Kim S, Kalinin SV, Jesse S. Mitigating E-beam-induced Hydrocarbon Deposition on Graphene for Atomic-Scale Scanning Transmission Electron Microscopy Studies. Journal of Vacuum Science & Technology B, 2018

**2017**

Ziatdinov M, Dyck O, Maksov A, Li X, Sang X, Xiao K, Unocic RR, Vasudevan R, Jesse S, and Kalinin SV. Deep Learning of Atomically Resolved Scanning Transmission Electron Microscopy Images: Chemical Identification and Tracking Local Transformations. ACS Nano, 2017

Dyck O, Leonard ND, Edge LF, Jackson CA, Pritchett EJ, Deelman PW, Poplawsky JD. Accurate Quantification of Si/SiGe Interface Profiles via Atom Probe Tomography. Advanced Materials Interfaces, 2017

Dyck O, Kim S, Kalinin SV, Jesse S. Placing single atoms in graphene with a scanning transmission electron microscope. Applied Physics Letters, 2017

Sneed BT, Cullen DA, Reeves KS, Dyck OE, Langlois DA, Mukundan R, Borup RL, More KL. 3D Analysis of Fuel Cell Electrocatalyst Degradation on Alternate Carbon Supports. ACS Applied Materials & Interfaces, 2017

Li X, Belianinov A, Dyck O, Jesse S, and Park C. Two-level structural sparsity regularization for identifying lattices and defects in noisy images. Annals of Applied Statistics, 2017

**2016**

Yang B, Dyck O, Ming W, Du M, Das S, Rouleau CM, Duscher G, Geohegan DB, and Xiao K. Observation of Nanoscale Morphological and Structural Degradation in Perovskite Solar Cells by In Situ TEM. ACS Applied Materials and Interfaces, 2016

Leonard DN, Dyck O, Poplawsky JD, More KL, Edge LF, Jackson CA, Pritchett EJ, Deelman PW. Quantification of atomic arrangements at heterostructure interfaces. Microscopy and Microanalysis, 2016

Dyck O, Leonard DN, Poplawsky JD, Pritchett EJ, Kiselev AA, Jackson CA, Edge LF. Considerations and challenges with characterizing Si/SiGe interfaces. Microscopy and Microanalysis, 2016

**2015**

Dyck O, Hu S, Das S, Keum J, Xiao K, Khomami B, Duscher G. Quantitative Phase Fraction Detection in Organic Photovoltaic Materials through EELS Imaging. Polymers, 2015

Yang B, Dyck O, Poplawsky J, Keum J, Puretzky A, Das S, Ivanov I, Rouleau C, Duscher G, Geohegan D, Xiao K. Perovskite solar cells with near 100% internal quantum efficiency based on large single crystalline grains and vertical bulk heterojunctions. Journal of the American Chemical Society, 2015

Yang B, Dyck O, Poplawsky J, Keum J, Das S, Puretzky A, Aytug T, Joshi PC, Rouleau CM, Duscher G, Geohegan DB, Xiao K. Controllable growth of perovskite films by room-temperature air exposure for efficient planar heterojunction photovoltaic cells. Angewandte Chemi, 2015

Kaveh M, Dyck O, Duscher G, Gao Q, Jagadish C, Wagner HP. Exciton emission from hybrid organic and plasmonic polytype InP nanowire heterostructures. Materials Research Express, 2015

Atkinson III RW, St. John S, Dyck O, Unocic KA, Unocic RR, Burke CS, Cisco JW, Rice CA, Zawodzinski Jr TA, Papandrew AB. Supportless, Bismuth-Modified Palladium Nanotubes with Improved Activity and Stability for Formic Acid Oxidation. ACS Catalysis, 2015

Das S, Keum KK, Browning JF, Gu G, Yang B, Dyck O, Do C, Chen W, Chen J, Ivanov IN, Hong K, Rondinone AJ, Joshi CP, Geohegan DB, Duscher G, Xiao K. Correlating high power conversion efficiency of PTB7: PC 71 BM inverted organic solar cells with nanoscale structures. Nanoscale, 2015

John S, Atkinson RW, Dyck O, Sun C, Zawodzinski TA, Papandrew AB. Segregated Pt on Pd nanotubes for enhanced oxygen reduction reactivity in alkaline electrolyte. Chemical Communications, 2015

**2014**

Xiao Z, Yuan Y, Yang B, VanDerslice J, Chen J, Dyck O, Duscher G, Huang J. Universal formation of compositionally graded bulk heterojunction for efficiency enhancement in organic photovoltaics. Advanced Materials, 2014

Gu Y, Wang C, Liu F, Chen J, Dyck OE, Duscher G, Russell TP. Guided crystallization of P3HT in ternary blend solar cell based on P3HT: PCPDTBT: PCBM. Energy & Environmental Science, 2014

Hu S, Dyck O, Chen H, Hsiao YC, Hu B, Duscher G, Dadmun M, Khomami B. The impact of selective solvents on the evolution of structure and function in solvent annealed organic photovoltaics. RSC Advances, 2014

Yadavali S, Sachan R, Dyck O, Kalyanaraman R. DC electric field induced phase array self-assembly of Au nanoparticles. Nanotechnology, 2014

Dyck O, Hu S, Khomami B, Duscher G. Electron energy-loss spectroscopic imaging for phase detection in organic photovoltaics. Microscopy and Microanalysis, 2014

**2013**

Mohsin A, Liu L, Liu P, Deng W, Ivanov IN, Li G, Dyck OE, Duscher G, Dunlap JR, Xiao K, Gu G. Synthesis of millimeter-size hexagon-shaped graphene single crystals on resolidified copper. ACS Nano, 2013

**2012**

Sachan R, Gonzalez C, Dyck O, Wu Y, Garcia H, Pennycook SJ, Rack PD, Duscher G, Kalyanaraman R. Enhanced absorption in ultrathin Si by NiSi2 nanoparticles. Nanomaterials and Energy, 2012

**Book Chapters:**

Qiao Q (Ed.). Organic Solar Cells: Materials, Devices, Interfaces, and Modelling, Chapter 9: Nanophase Separation in Organic Solar Cells. CRC Press, 2015

**Draft Publications:**

X Li, O Dyck, SV Kalinin, S Jesse. Compressive sensing on diverse STEM scans: real-time feedback, low-dose and dynamic range. arXiv preprint arXiv:1805.04957

Ondrej Dyck, Feng Bao, Maxim Ziatdinov, Ali Yousefzadi Nobakht, Seungha Shin, Kody Law, Artem Maksov, Bobby G Sumpter, Richard Archibald, Stephen Jesse, Sergei V Kalinin. Single atom force measurements: mapping potential energy landscapes via electron beam induced single atom dynamics. arXiv preprint arXiv:1804.03729

**Patents:**

Geohegan DB, Keum JK, Poplawsky JD, Xiao K, Yang B, Dyck O. Hybrid perovskite films, 2017, US 20170098514 A1

**Patent Disclosures:**

Kalinin SV, Jesse S, Dyck O, Sumpter B. Electron Beam Controlled Nano-Robotic Device, 2017

Jesse S, Dyck O, Kalinin SV, Sumpter B. Atom assembly device, 2017

Jesse S, Kalinin SV, Borisevich AY, Dyck O, Unocic R. Atomic-scale e-beam sculpter, 2017

**Select Presentations:**

Microscopy and Microanalysis 2018 (*poster*) Atom-by-Atom Assembly in Aberration Corrected STEM and the Role of Chemistry at the Surface of Graphene

Microscopy and Microanalysis 2018 (*platform*) Automated Atom-by-Atom Assembly of Structures in Graphene: The Rise of STEM for Atomic Scale Control

Microscopy and Microanalysis 2018 (*platform*) Graphene Defect Editing, Deposition, and Growth via E-Beam-Induced Organic Reactions in Aberration Corrected STEM

Microscopy and Microanalysis 2018 (*platform*) Leveraging Single Atom Dynamics to Measure the Electron-Beam-Induced Force and Atomic Potentials

Materials Research Society Spring 2018 (*platform*) Assembling small structures atom-by-atom in the scanning transmission electron microscope

Materials Research Society Fall 2018 (*platform*) Using Temperature-Controlled Hydrocarbon Deposition for Nanoscale Material Modification in STEM

Materials Research Society Fall 2018 (*invited platform*) Atomic level manipulation of matter using Scanning Transmission Electron Microscopy

Materials Research Society Fall 2017 (*platform*) Atom-by-atom Fabrication via Beam Controlled Organic Reactions

Materials Research Society Fall 2017 (*platform*) Atomic Manipulation of Si Atoms via Electron Beams—Observations, Mechanism and Control

Appalachian State University invited colloquium speaker, Aberration corrected STEM, teaching the machines, and the atomic forge: Forward-looking thoughts on state-of-the-art transmission electron microscopy

Appalachian Regional Microscopy Society 2016 annual meeting (*invited platform*), Quantum grade materials characterization through aberration corrected STEM

Microscopy and Microanalysis 2016 annual meeting (*poster*), Considerations and challenges with characterizing Si/SiGe interfaces

Appalachian Regional Microscopy Society annual meeting 2015 (*poster*), Advanced TEM Characterization Techniques for OPV Materials

Appalachian Regional Microscopy Society annual meeting 2015, Lead the demo of the EFTEM imaging capabilities at the University of Tennessee, Knoxville microscopy lab for an EFTEM imaging workshop

Microscopy and Microanalysis 2014 annual meeting (*invited platform*), Organic photovoltaic materials characterization in a TEM

Center for Nanophase Materials Science user meeting 2014 (*poster*), Advanced TEM Characterization Techniques for OPV Materials

TNSCORE meeting 2014 (*poster*), Advanced TEM Characterization Techniques for OPV Materials

Appalachian Regional Microscopy Society annual meeting 2012 (*poster*), Enhanced absorption in ultra-thin Si by NiSi2 nanoparticles

**Graduate Advisor:**

PhD Advisor: Prof. Gerd Duscher, University of Tennessee, Knoxville