WASHINGTON NANOFABRICATION FACILITY
UNIVERSITY of WASHINGTON

UW MEM·C

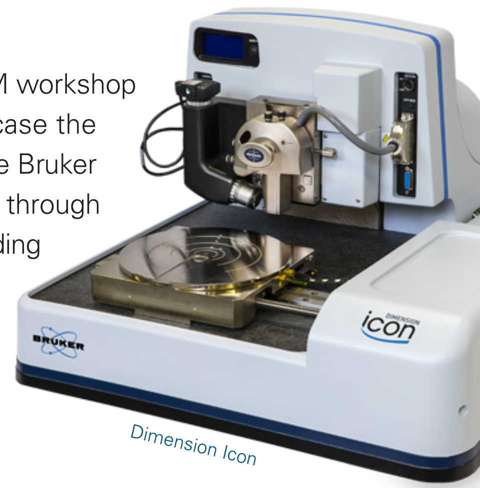
BRUKER

Two-Day Workshop at the University of Washington

Latest Updates in Atomic Force Microscopy

November 4-5, 2025
University of Washington | Seattle, WA

Discover the Latest Advances in AFM Technology


Dimension Icon

UW MEM-C, **UW Nanofabrication Facility**, and **Bruker** are pleased to co-host an AFM workshop on November 4-5, 2025. During this free two-day event, our AFM experts will showcase the unique and powerful capabilities of the technique. Hands-on demonstrations will feature Bruker **Dimension Icon** and **Dimension FastScan**, accessible to both UW and non-UW users through MEM-C's Shared Facilities and Nanofabrication Facility, respectively. If interested in providing samples for Bruker's experts to demonstrate during the workshop, please register and email Dr. Thi Kieu Ngan Pham at **Thi_Kieu_Ngan.Pham@bruker.com**.

We hope to see you there!

Space is limited.

Register now to secure your spot!

Scan the QR code or **click here** to register.

Workshop Organizers

Dr. Paul Nguyen
Facility Manager, UW Molecular Engineering Materials Center

Dr. Darick Baker
Acting Director, Washington Nanofabrication Facility
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Cameron Toskey
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Abigail Sohm
UW PhD Student, Department of Materials Science and Engineering, MEM-C AFM Superuser
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Dr. Thi Kieu Ngan Pham
US West Coast Sales Manager, Bruker
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Workshop Location

University of Washington, Seattle Physics and Astronomy Tower
Rooms: C520 (talks) & C108 (lunch)
3910 15th Ave NE, Seattle, WA 98195

View on Google Maps

View event agenda on the next page

UW MEM-C is supported by the National Science Foundation MRSEC program under NSF Award Number DMR-2308979. Learn more at **mem-c.washington.edu**.

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Tuesday, November 4

8:45AM	**Check-in PAT C520**
9:00AM	**Introduction**
9:15AM	**AFM of 2D Materials, Heterostructures and Nanodevices** Dr. Paul Nguyen, MEM-C
9:45AM	**Mapping Mechanical Properties And Morphologies of Polymer-based Materials With AFM** Dr. Ilias Halimi, Bruker
10:15AM	**Coffee Break**
10:25AM	**Nanoscale Chemistry and Beyond : Correlative Photothermal AFM-IR Spectroscopy and Imaging** Dr. Jin Hee Kim, Bruker
10:50AM	**Novel AFM electrical modes for 2D materials and semiconductors** Dr. Thomas Mueller, Bruker
11:30AM	**Lunch Break** (provided)
1:00PM	**Washington Nanofabrication Facility Tour**

Demo Sessions
Molecular Engineering Materials Center NanoES G65B
Molecular Engineering & Sciences Building
3946 W. Stevens Way NE, Seattle, WA 98195

1:30PM	**Demo on Dimension Icon/MEM-C**
2:00PM	**Sample Measurement 1**
4:00PM	**Sample Measurement 2**

Wednesday, November 5 — Demo Sessions

9:30AM	**Sample Measurement 3**
1:30PM	**Sample Measurement 4**
3:30PM	**Sample Measurement 5**
5:30PM	**End of Workshop**

DR. PAUL NGUYEN
UNIVERSITY OF WASHINGTON

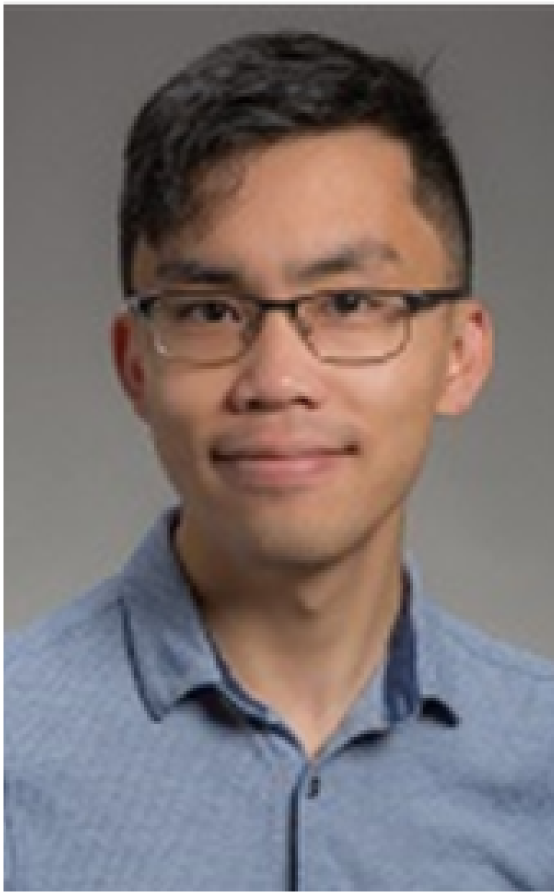
AFM of 2D Materials, Heterostructures, and Nanodevices

Dr. Paul Nguyen is a Postdoctoral Researcher in the Cobden Nanodevice Physics lab at the University of Washington (UW) and the Facilities Manager of the UW Molecular Engineering Materials Center (MEM-C) Shared Facility (MSF). His expertise is in two-dimensional (2D) materials, their fabrication into van-der-Waals heterostructures and integration into nanodevices, as well as their in-operando study by electrical transport, surface probe microscopies, and angle-resolved photoemission spectroscopy.

Abstract

The ever-expanding family of 2D materials presents a deep well for discovering novel phenomena and applications. Because they are atomically flat, different 2D materials can be stacked to form pristine heterostructures and nanodevices. Atomic force microscopy (AFM), as a surface probe technique, is ideally suited to investigating these systems. This talk will present an overview of the critical roles AFM plays in 2D nanodevice fabrication and characterization in the MSF. Highlighted applications will include:

- Nanomechanical manipulation of trapped interlayer contaminants to enhance interlayer coupling and electrical/optical properties
- Shaping graphene and graphite using AFM-based electrochemical etching
- Characterizing 2D moiré superlattice by horizontal-piezoresponse force microscopy
- Imaging and manipulating rhombohedral domains in multilayer graphene with conductive AFM and scanned Kelvin probe force microscopy (KPFM)
- KPFM imaging of the selective adsorption of fullerene on graphene moiré systems



DR. ILIAS HALIMI

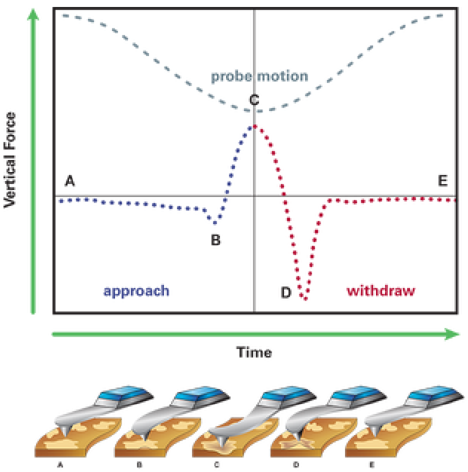
BRUKER

Mapping Mechanical Properties And Morphologies of Polymer-based Materials With AFM

Dr. Ilias Halimi has a B.Sc from McGill University and a M.Sc from the University of Ottawa. Dr. Halimi worked with Prof Gilbert Walker at the University of Toronto for his PhD studies. There, he developed himself as an AFM expert with extensive NanoIR knowledge on Bruker Inspire and Dimension 5000 AFMs. He currently works as an Application Scientist for Bruker Nano under the AFM and Optical Profiling divisions.

Abstract

For the past 3 decades, AFM has been one of the most powerful techniques for nanoscale characterization of polymer films. AFM has been used to map both topographical and mechanical properties of polymer films. The sharp AFM probe offers both high lateral resolution for topographical results and can be used as a nanoindenter to extract the Young’s modulus of the polymer films. This presentation will discuss the three main AFM modes and how each mode operates. Emphasis will be put on Bruker's unique PeakForce Tapping mode and its application to polymer science. We will demonstrate how PeakForce Tapping can simultaneously provide topographical, mechanical, and adhesion maps. Example cases will also include block copolymer films and suspended membranes.



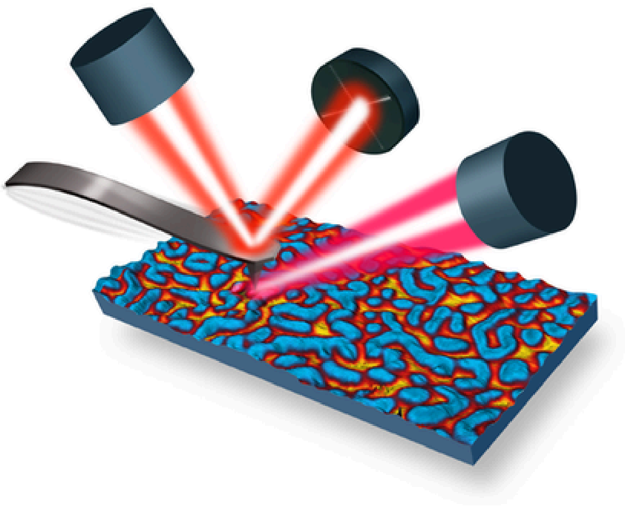
Nanoscale Chemistry and Beyond : Correlative Photothermal AFM-IR Spectroscopy and Imaging

DR. JIN HEE KIM
BRUKER

Dr. Jinhee Kim is a NanoIR Applications Scientist at Bruker Nano. She earned her Ph.D. from the University of Michigan and completed postdoctoral research at Monash University in Australia focusing on NanoIR technology.

Abstract

Photothermal atomic force microscopy-infrared (AFM-IR) combines the chemical specificity of infrared absorption with the nanoscale spatial resolution of atomic force microscopy (AFM), enabling direct correlation between local composition, structure, and morphology. Operating through photothermal expansion detection at the AFM tip, AFM-IR circumvents the diffraction limit inherent to conventional IR spectroscopy, achieving spatial resolution on the order of tens of nanometers with monolayer sensitivity. In this work we cover the fundamentals of AFM-IR, various AFM-IR modes, and key drivers of high performance and sensitivity of AFM-IR such as mechanical compensation with phase-locked loop (PLL). Then we will highlight AFM-IR's applications in polymers, biologics, 2D materials and more.



DR. THOMAS MUELLER
BRUKER

Novel AFM Electrical modes for 2D Materials and Semiconductors

Dr. Thomas Mueller leads the AFM, nanoIR, and Nanoindentation businesses at Bruker. Over his 21 years with the company, he has worked in applications and business management and authored more than 50 publications, reviews, and application notes. He earned his Ph.D. from Yale University in 2000, where he developed new linear and nonlinear spectroscopic probes of molecular structure and dynamics. He then completed postdoctoral research at Columbia University, applying scanning probe microscopy to study self-assembly and chemical reaction specificity.

Abstract

Recent advances in electronic materials and devices, driven by the semiconductor roadmap, quantum computing, and the emergence of tunable platforms like 2D materials and metal-organic frameworks, have created new demands for nanoscale characterization. In this talk, we present how innovations in atomic force microscopy (AFM) are meeting these challenges. We will highlight the capabilities of scanning microwave impedance microscopy (sMIM) in detecting buried structures, quantifying carrier densities, and resolving stacking orders in 2D materials. Further, we demonstrate how integrating electrical modes into PeakForce Tapping enables high-resolution, correlated property mapping, paving the way for machine learning applications.

The use of PeakForce Tapping also enhances probe optimization, improving sensitivity in electric field characterization techniques such as EFM, MFM, and KPFM. We conclude with an outlook on emerging approaches that leverage multiple time gates in PeakForce Tapping-based electrical modes, opening new frontiers in functional imaging.