THE FUTURE IS ...

N.E.A.R.

NANOTECHNOLOGY EDUCATION AND RESEARCH

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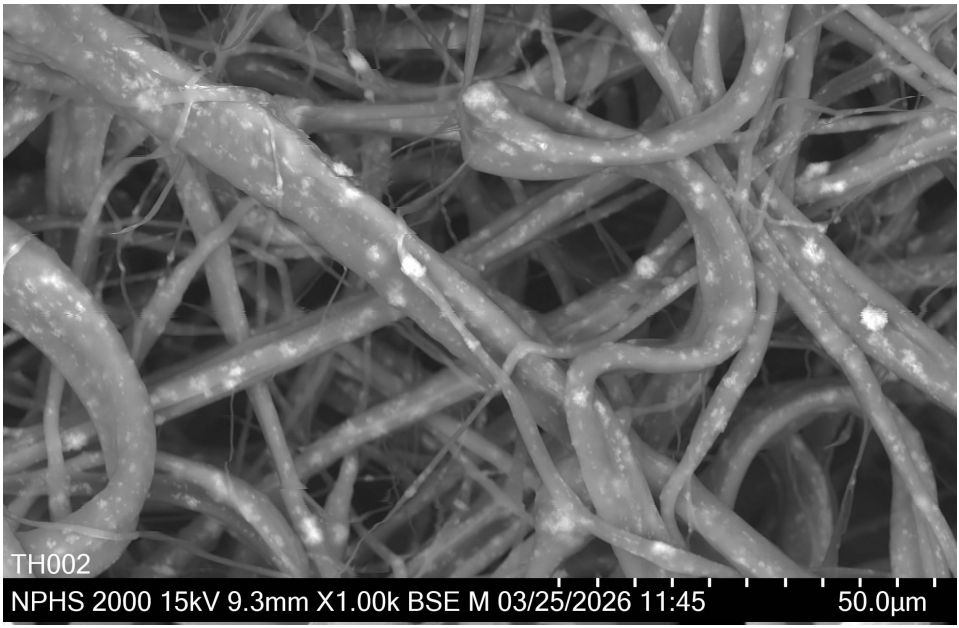
Technology&Engineering
Discover your Future

PROJECT LEAD THE WAY PLTW

nERL



Completing its 21st year, The Future is N.E.A.R. program (Nanotechnology Education and Research) at North Penn is a custom designed STEM education experience engaging senior Engineering Academy students in the exciting world of nanotechnology, experimental design, and engineering research. Students work in design teams to research and develop solutions to global challenges by capitalizing from the fundamentals of materials science, engineering, and nanotechnology while utilizing a combination of their own creativity coupled with some of the latest published research available.

The N.E.A.R. program is woven into the Engineering Design and Development course of the Project Lead the Way program here at North Penn. It offers our students an opportunity to gain essential 21st century skills that prepare them to become successful leaders!

Thursday, May 28th, 2026
North Penn High School Auditorium
Seven O'Clock P.M.

2025-2026 Engineering Design and Development

Nanotechnology & Engineering Research Teams

Welcome to the 21st Annual North Penn High School Engineering Academy Nanotechnology and Engineering Symposium!

The evening will begin at 7:00pm in the auditorium with introductions to research from each of the teams. The students will bring you up to date with the research endeavors they have been performing throughout this school year. Following their presentations, the evening will continue in the auxiliary gymnasium where the students will offer poster presentations, interactive demonstrations of their research, and much more...

ArthriTech

Shivam Joshi-Awasthi
Sherri Learn
Nayden Padilla
Aurora Pembroke

AtmosHarvest

Mingzhun An
SM Salim

Carbon Collect

Donald Crump
Elijah Pinckney

Heats Inc.

Max Brodsky
Natalie Dunman
Charlie Hawthorne
Cameron Higgins

Eco-Fuel

Taylor Bortnichak
Mia Marsicano

InvisiRay

Aidan Behrle
Debi Kundu
Nolan Lentz

Hy-Tech

Joe Ennis
Mel Kleback
Dennis Roginskiy

Sylogreen

Youssef Ghorbal
Logan Krider
Sam Shafer

PFASt Fetch

Paige Kawano
Ryan Nevard

Thermal Capture

Shayla Ramic
Nick Sigler

Piezo Powerhouse

Farhan Rafi
Nathan Seligman
Jawad Shaikh

2025-2026 Engineering Design and Development

Nanotechnology & Engineering Research Teams

Mingzhun An — AtmosHarvest

Mingzhun will be attending Iowa State University to major in Aerospace Engineering this autumn. During his time in the North Penn Engineering Academy, he has focused on practical laboratory research within the nERL. His current project involves exploring enzymatic pathways for synthetic starch production, specifically focusing on the chemical processes and reagent handling required for successful synthesis.

Aidan Owen Behrle — InvisiRay

Aidan will be furthering his education at the Penn State University School of Engineering. He will be majoring in Mechanical Engineering and minoring in Material Science. Aidan was a Varsity Soccer starter and a 400m and 800m track athlete. He completed 5 courses in the North Penn Engineering Academy and has gained so much experience in CNC, nanofabrication, and all things engineering. He was Secretary of the Ski and Snowboard Club and an active member in the National Honor Society.

Taylor Bortnichak — Eco-Fuel

Taylor will be attending Millersville University in the Osburn School of Engineering, where she will major in Computer Aided Drafting and Design. Through completing four courses in the North Penn Engineering Academy, she has built a strong foundation in engineering while further deepening her passion for the field.

Max Brodsky — Heats Inc.

Max is an avid pursuer of both the sciences and the arts, as a recognized National Merit Scholar Finalist and PMEA All-State Musician. He frequently performs in theatrical productions, most recently as Sky Masterson in Gwynedd Mercy Academy's Guys and Dolls; with North Penn's select choral ensembles, and with North Penn's Wind Ensemble on clarinet. Max will be continuing his education this fall at Penn State University Park with a major in Chemical Engineering.

Donald Crump — Carbon Capture

Donald will be attending Temple University in the College of Engineering to major in mechanical engineering. Donald completed four courses in the North Penn Engineering Academy. In Donald's junior year, he participated in and completed the 2025 Exelon Foundation Boys to STEM Academy hosted at Saint Joseph University. He has also consistently ran indoor and outdoor track every year of high school.

Natalie Dunman — Heats Inc.

Natalie will be attending Penn State University Park as an Undecided Engineering major. She completed three courses in the North Penn Engineering Academy, gaining knowledge about design, electrical systems, coding and more. She has a wide variety of interests and strives to participate in activities she enjoys, from work in Stage Crew for the North Penn Theatre program to being a dedicated member of the E.P.I.C.S club.

2025-2026 Engineering Design and Development

Nanotechnology & Engineering Research Teams

Joseph Ennis — Hy-Tech

Joe will attend Widener University to earn a degree in mechanical engineering, electrical engineering, or a similar engineering program. They have taken, in their career in North Penn, Introduction to Engineering Design, Principles of Engineering, Computer Integrated Manufacturing, and Engineering Design and Development and is currently taking Engineering Design and Development.

Youssef Ghorbal — Sylogreen

Youssef will be attending Drexel University to earn a BS in Electrical Engineering. Youssef is a member of NHS, Muslim Student Association, and the Muslim Interscholastic Student Tournament. Youssef has completed five courses in the NP Engineering Academy.

Charles Hawthorne — Heats Inc.

A National Merit Scholar and Presidential Scholar Candidate, Charlie will be attending Penn State University Park in Fall of 2026. Building on his time in the Engineering Projects in Community Service Club and the North Penn Engineering Academy, Charlie will be pursuing a Materials Science and Engineering degree. His leadership and problem-solving skills have prepared him to make the most of college and the new experiences that await him there.

Cameron Higgins — Heats Inc.

An incoming Mechanical Engineering major at Drexel University, Cameron also pursues minors in Electrical Engineering and Computer Science. In the North Penn Engineering Academy, he gained technical expertise in CNC machining, coding, laser cutting, and Six Sigma manufacturing. Beyond academics, Cameron is a highly involved student, serving as an NPTV Anchor, competing in Science Olympiad, and volunteering as member of the National Honor Society, Unicef, Key Club and EPICS.

Shivam Joshi-Awasthi — ArthriTech

Shivam will be attending Georgia Tech to major in Computer Science. During his time at North Penn, Shivam has completed multiple interdisciplinary AP courses like Biology and Calculus BC. He has also published his work, Beyond Images: Seeing the Unseen for Early Detection of Alzheimer's Disease, in *Alzheimer's and Dementia: The Journal of the Alzheimer's Association*

Paige Kawano — PFASt Fetch

Paige will continue on her journey of higher education after graduation. During her time at North Penn, Paige has completed five engineering courses in the engineering academy: Intro to Engineering Design, Principles of Engineering, Computer Integrated Manufacturing, Mechanical Drawing, and Engineering Design and Development. Paige is an Engineering Intern at North Penn Water Authority, which was an inspiration for the basis of her research this year.

2025-2026 Engineering Design and Development

Nanotechnology & Engineering Research Teams

Mel Kleback — Hy-Tech

After graduation, Mel will be attending Tufts University in Medford Massachusetts to pursue a degree in mechanical engineering. He has taken four engineering courses: Introduction to Engineering Design, Principles of Engineering, Computer Integrated Manufacturing, and Engineering Design and Development. Mel also served as the Treasurer for the Engineering Projects in Community Service (EPICS) club.

Logan Krider — Sylogreen

Logan will be attending Colorado State University, where he has been accepted into the Walter Scott, Jr. College of Engineering to pursue a degree in Civil Engineering. He completed four courses in the Engineering Academy, gaining knowledge in CNC, AutoCAD, materials science, and the process of engineering. Logan has been an important asset to the North Penn Volleyball team for the past two years. Out of the 29 schools competing in PIAA D1 3A, Logan made the first all-conference team.

Deblina Kundu — InvisiRay

Pursuing a Mechanical Engineering degree at Drexel University, Deblina Kundu also plans to minor in materials science due to her love for all things nanotechnology. She has been a dedicated member of the Engineering Academy since sophomore year. Through her years, she has built strong skills in computer science, digital electronics, AutoCAD, and microscopy. Beyond the classroom, she is NPTV's lead anchor, mentors through STEM camps, tutors math, and works as a barista.

Sherri Learn — AtmosHarvest

Sherri is a member of National Honor Society, stage crew, and is a National Merit Scholar. She has taken five Engineering Academy courses: Intro to Engineering Design, Principles of Engineering, AP Computer Science Principles, Digital Electronics, and Engineering Design & Development, and she plans to pursue a degree in Electrical Engineering at Temple University.

Nolan Andrew Lentz — InvisiRay

Nolan Lentz will be continuing his education at Penn State University Park to major in Mechanical Engineering. Nolan was a part of the Model Aviation Club for his sophomore and junior years and completed four courses in the North Penn Engineering Academy. He gained knowledge and experience in CNC, nanotechnology, building model airplanes, and the overall basics of engineering.

Mia Marsicano — Eco-Harvest

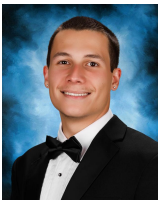
After graduation, Mia will be attending Penn State University to study chemical engineering. She has completed five courses in the Engineering Academy. Outside of the classroom, Mia was a North Penn cheerleader for four years and was captain during her final year.

2025-2026 Engineering Design and Development

Nanotechnology & Engineering Research Teams

Ryan Nevard — PFASt Fetch

After graduation, Ryan will be attending the University of Delaware to pursue a degree in mechanical engineering. He has taken six engineering courses at North Penn High School: Introduction to Engineering Design, Principles of Engineering, Computer Integrated Manufacturing, Spatial Computing, Computer Science Principles, and Engineering Design and Development.

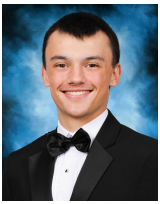


Jayden Padilla — ArthriTech

After graduation, Jayden will be attending West Chester University to pursue a degree in business. He has taken four engineering courses in the Engineering Academy: Introduction to Engineering Design, Digital Electronics, Principles of Engineering, and Engineering Design and Development.

Aurora Pembroke — ArthriTech

Aurora will be attending West Chester University for Physics in Engineering. She plans to transfer to Penn State University after 2 years to finish her degree.. She is also a dedicated North Penn Thespian. Aurora has been involved with many of the shows and just recently was stage manager for both the fall and spring shows. She plans on using everything that she learned from high school to be a dedicated student in college and to continue being passionate about engineering.



Elijah Pinckney — Carbon Capture

Elijah will be attending Slippery Rock University in the fall to pursue a degree in mechanical engineering. He has taken four courses in the engineering academy and looks to build upon his knowledge and experience in the discipline. Elijah has also been a member of the North Penn Track team, and is an asset to their current successes.

Farhan Uddin Rafi — Piezo Powerhouse

Farhan Rafi will be attending Temple university to major in Biology, and later Dental school for general dentistry. He has earned honor roll all throughout high school and completed six courses in the North Penn Engineering Academy. His drive for exploring knowledge and helping others motivates him to become a doctor. Rafi is a member of Bengali Cultural club, Muslim Association Club, and Badminton Club.

Shayla Ramic — Thermal Capture

Shayla will be attending the University of Minnesota for Mechanical Engineering. Shayla has taken 4 courses in the Engineering Academy.

2025-2026 Engineering Design and Development

Nanotechnology & Engineering Research Teams

Dennis Roginskiy — Hy-Tech

Dennis will attend Penn State Abington with plans to transfer to Penn State's main campus in University Park to complete his bachelor's degree in Electrical Engineering. He has taken Introduction to Engineering and Design, Principles of Engineering, Digital Electronics, and Engineering Design & Development. In the E.P.I.C.S. club, Dennis served as the communications officer and vice president.

SM Salim — AtmosHarvest

Salim has completed all five courses in the North Penn Engineering Academy, gaining experience in CNC machining, laser cutting, and 3D modeling. He is a member of the Bengali Cultural Club, Muslim Associate Club, Badminton Club, and E.P.I.C.S. Through these experiences, he has developed technical skills and an interest in engineering and collaborative problem-solving.

Nathan Seligman — AtmosHarvest

Nate will be attending Syracuse University to major in Mechanical Engineering. His interest in moving, whether that be by car or bike, was the foot in the door. The North Penn Engineering Academy opened that door, allowing him to take five courses throughout his time in North Penn. His thirst for knowledge and constant movement will allow him to thrive outside of North Penn.

Sam Shafer — AtmosHarvest

Sam will continue his education at Rochester Institute of Technology to major in Packaging Science in the College of Engineering Technology. He has competed on both the North Penn Water Polo and Swimming and Diving Teams for four years, leading the Water Polo team as Senior co-captain. Sam has completed three Engineering Courses at North Penn as well as one year of Drafting and Design at NMTCC.

Jawad Shaikh — Piezo Powerhouse

Jawad Shaikh will be attending Temple University to major in Computer Science. He has taken four AP classes and a several honor classes. He completed four courses in the Engineering Academy. He was a member of the Bengali Cultural club, Muslim Association club, Table Tennis Club, and Badminton Club. His desire for knowledge and experience drives him to further heights to elevate him into a competent individual.

Nick Sigler — Carbon Collect

Nick will be attending York College of Pennsylvania to pursue his academic career in civil engineering. Through the years in North Penn High School he has taken multiple engineering courses to help reach his future in college and his life afterwards.


ENERGY / ENVIRONMENT
TEAM: Hy Tech
ENERGY / ENVIRONMENT
TEAM: Eco Fuel
ENERGY
TEAM: Heats Inc.
HEALTH / BIOMEDICAL
TEAM: ArthriTech
ENERGY
TEAM: Piezo Powerhouse
Entrance
PLTW
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HITACHI Inspire the Next
nERL
2026 Nanotechnology & Engineering Symposium
Research Team Poster Sessions & Demonstrations
Hitachi TM4000PLUS Scanning Electron Microscope with Oxford EDS
Zeiss PrimoStar and Stemi 508 Microscopes with Darkfield Analysis
Keithley Source Meter
Mark 10 ESM303 Tensile Tester
Vernier Sensors
RheoSense microVISC Rheometer
Polymer Preparation
Electrospinning
Laurell Technologies Spin Coater
Food Table
IMAGE SHOW
TV
Food Table
MATERIALS SCIENCE
TEAM: Thermal Capture
TEAM: PFASt Fetch
ENVIRONMENT
Exit
TEAM: Sylogreen
ENVIRONMENT
TEAM: InvisiRay
MATERIALS SCIENCE
TEAM: AtmosHarvest
BIOENGINEERING
TEAM: Carbon Collect
ENVIRONMENT

2025-2026 NPHS Nanotechnology & Engineering Research Lab Endeavors

Healthcare
ArthriTech
Shivam Joshi-Awasthi
Sherri Learn
Jayden Padilla
Aurora Pembroke

Environment
Carbon Collect
Donald Crump
Elijah Pinckney

Environment
Eco-Fuel
Taylor Bortnichak
Mia Marsicano

Energy
Hy-Tech
Joseph Ennis
Mel Kleback
Dennis Roginskiy

Environment
PFASt Fetch
Paige Kawano
Ryan Nevard

Energy
Piezo Powerhouse
Farhan Rafi
Nate Seligman
Jawad Shaikh

Environment
AtmosHarvest
Mingzhun An
SM Salim

Energy
Heats Inc.
Max Brodsky
Natalie Dunman
Charles Hawthorne
Cameron Higgins

Environment
Sylogreen
Youssef Ghorbal
Logan Krider
Samuel Shafer

Energy
InvisiRay
Aidan Behrle
Deblina Kundu
Nolan Lentz

Safety
Thermal Capture
Shayla Ramic
Nicholas Sigler

NORTH PENN HIGH SCHOOL ENGINEERING ACADEMY | NANOTECHNOLOGY & ENGINEERING RESEARCH LAB | H-003

Laurell Technologies WS-400 Spin Coater

RheoSense microVISC

Mark 10 ESM303 Tensile / Compression

Zeiss Stemi 508 Stereo Microscope

Hitachi TM4000plus Scanning Electron Microscope

2025-2026 Engineering Design and Development
Nanotechnology & Engineering Research Teams

ACKNOWLEDGEMENTS

We would like to thank the following individuals, organizations, companies, and universities for their invaluable support.

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NPHS Technology, Engineering, and Computer Science Department

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Summer Hamilton

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Evan Slow

Laurell Technologies

Chris Lake
Paul Grasso

2025-2026 Engineering Design and Development

Nanotechnology & Engineering Research Teams

THANK YOU NORTH PENN EDUCATIONAL FOUNDATION FOR YOUR SUPPORT!

WE COULDN'T DO IT WITHOUT YOU!!!

The North Penn School District Educational Foundation, a 501c (3) corporation, is a collaborative effort among individuals committed to enriching the education and lives of more than 13,000 students in each of the North Penn School District's (NPSD) 18 schools, every single day.

Often referred to as "the Foundation" our mission is to motivate and inspire students and staff in the North Penn School District through innovative projects and opportunities that enhance educational experiences and resources.

To learn more about the Foundation or to donate, please visit their website at: www.npennedfoundation.org

THANK YOU NORTH PENN CURRICULUM DEPARTMENT FOR YOUR SUPPORT!

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2026 Nanotechnology and Engineering Symposium

North Penn High School Engineering Academy

NORTH PENN TECHNOLOGY AND ENGINEERING EDUCATION DEPARTMENT

PROJECT LEAD THE WAY | ENGINEERING DESIGN AND DEVELOPMENT

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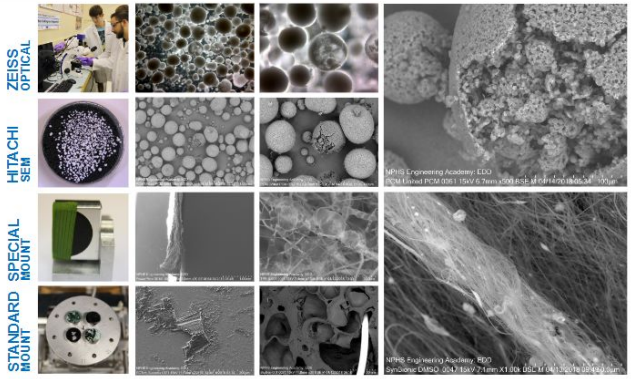
Hitachi TM4000 PLUS

Materials Characterization

Item	TM4000Plus	TM4000
Magnifications	×10 - ×100,000 (Photographic magnification*1) ×25 - ×250,000 (Monitor display magnification*2)	
Accelerating voltage	5 kV, 10 kV, 15 kV	
Image signal	Backscattered electron Secondary electron Mix (Backscattered electron+ Secondary electron)	Backscattered electron
Vacuum mode	BSE: Conductor/Standard/ Charge-up reduction SE: Standard/ Charge-up reduction Mix: Standard/ Charge-up reduction	BSE: Standard/ Charge-up reduction
Image mode (BSE)	Normal/Shadow 1/Shadow 2/TOPO	
Sample stage traverse	X : 40 mm, Y : 35 mm	
Maximum sample size	80 mm (diameter), 50 mm (thickness)	
Electron gun	Pre-centered cartridge tungsten filament	
Signal detection system	High Sensitivity 4-segment BSE detector High-Sensitivity Low-Vacuum SE detector (UVD)	High-Sensitivity 4-segment BSE detector
Auto image adjustment function	Auto start, Auto focus, Auto brightness	
Image data saving	2,560 × 1,920 pixels, 1,280 × 960 pixels, 640 × 480 pixels	
Image format	BMP, TIFF, JPEG	
Data display	Micron marker, micron value, magnification, date and time, image number and comment, WD (Working Distance), accelerating voltage, vacuum mode, image signal, image mode	
Evacuation system (vacuum pump)	Turbo molecular pump: 67 L/s x 1 unit Diaphragm pump: 20 L/min x 1 unit	
Operation help functions	Raster rotation, Magnification presets (3 steps), Image shift (±50 µm @ WD6.0 mm)	
Safety functions	Over-current protection function, built-in ELCB	



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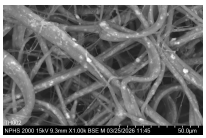

Cover Image:

Thermal Capture | PVDF / TiO2 Nanofibers

North Penn High School Engineering Academy

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Nanotechnology and Engineering Research Laboratory

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