

February 14, 2019

Daniel M. Filer, MBA, EdD
Chesapeake Watershed CESU Research Coordinator
National Capital Region – Resource Stewardship & Science
National Park Service
University of Maryland Center for Environmental Science – Appalachian Laboratory
301 Braddock Road – Room 304
Frostburg, MD 21532

RE: Enrollment in the Chesapeake Watershed CESU

Dear Mr. Filer,

West Virginia University is interested in enrolling in the Chesapeake Watershed CESU (CHWA CESU) as a new partner institution/organization. The CESU joint venture agreement has been reviewed and West Virginia University is willing to accept the 17.5% overhead as stipulated in the agreement.

The enclosed proposal provides information to support West Virginia University's capacity to support the work as a partner/organization of the CHWA CESU.

Contacts information for the CESU at West Virginia University are as follows:

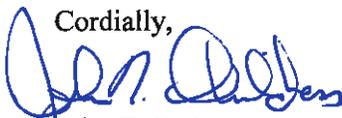
Technical:

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Manager, Geospatial Analytics Program
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Cordially,



John T. Childress
Director
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Chesapeake Watershed Cooperative Ecosystems Studies Unit Application- West Virginia University

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1. Expression of desire to enroll in the Chesapeake Watershed Cooperative Ecosystems Studies Unit as a new partner institution/organization.

West Virginia University is submitting the accompanying material to support an application to join the Chesapeake Watershed Cooperative Ecosystem Studies Unit (CHWA CESU) as a new nonfederal partner institution/organization. West Virginia University has a distinguished history of collaborating with local, state and regional partners in support of initiatives advancing goals and objectives of the CHWA CESU and its partners. We believe that these application materials will demonstrate our commitment to the mission of CHWA CESU and the importance of collaborative partnerships in advancing basic research, education and outreach as it relates to federal CESU members.

2. Confirming that institution/organization has read the CESU agreement and agrees to support the CESU mission and goals and fulfills the roles and responsibilities of a nonfederal partner, as described in the CESU agreement.

Director John Childress is supportive of this application. Through his endorsement he is providing assurance that West Virginia University is willing and able to meet the responsibilities and roles of a nonfederal partner and to support the CESU mission and goals. The primary contact, Dr. Paul Kinder, will also work with faculty, students and staff to ensure that West Virginia University meets these expectations while fulfilling the roles and responsibilities of a nonfederal partner.

3. Organization and Mission

i. Description of institution, mission, focus of collaborative activities

As a land-grant institution, West Virginia University's faculty, staff and students commit to creating a diverse and inclusive culture that advances education, healthcare and prosperity for all. This is accomplished by providing access and opportunity; by advancing high-impact research; and by leading transformation in West Virginia and the world through local, state and global engagement.

West Virginia University is accredited by the Higher Learning Commission. The WVU System is a family of distinctive campuses, which includes the WVU Institute of Technology in Beckley and the WVU Potomac State College in Keyser, united by a single mission. Student enrollment in the Fall 2017 was 31,442 across the three campuses. Offering degrees in 360+ majors in 14 Colleges and Schools.

WVU ranks nationally for prestigious scholarships: 25 Rhodes Scholars, 23 Truman Scholars, 5 USA Today All-USA College Academic First Team Members (and 11 academic team honorees), 26 Boren Scholars, 63 Gilman Scholars, 59 Fulbright Scholars, 3 Department of Homeland Security Scholars, 30 Critical Language Scholars, on Jack Kent Cooke Foundation Graduate Scholar, 5 National Institute of Standards and Technology Fellowships and 25 National Science Foundation Graduate Research Fellowships.

The mission of the Davis College of Agriculture, Natural Resources and Design at West Virginia University is to provide high-quality undergraduate and graduate education, conduct basic and applied research, engage in other creative and scholarly activities, and perform public outreach and service. Programs are designed to impart knowledge, train future leaders, address critical issues and enrich the lives of the citizens of West Virginia, while protecting the environment in which we live. These programs range from local to international in scope and promote the wise use of natural, renewable, and human resources. Overall, the Davis College at WVU is home to 2006 total students, 1739 undergraduate and 236 graduate.

Working with CESU partners, faculty from across the Davis College (see listing in section 2, below) can provide assistance through research activities, professional development opportunities (e.g., short courses and workshops), and service contributions (e.g., conferences and service-learning projects). College faculty work toward applied multidisciplinary research approaches to critical problems in many aspects of environmental and natural resources management, outdoor recreation, and tourism for local communities in West Virginia and beyond.

ii. Primary programs, departments, divisions

Within the Davis College, academic and programmatic units of interest include the following schools and programs. Website links are provided. The website URL for the Davis College is <https://www.davis.wvu.edu/>

School of Agriculture and Food: The School of Agriculture and Food is home to programs in Animal and Nutritional Sciences as well as Plant and Soil Sciences. These programs serve to equip future veterinarians, doctors, dietitians and agricultural specialists to meet the needs of local and global communities, in addition, the School seeks to provide research and education leadership in the fields of plants, soils and environmental sciences. Website URL: <https://agriculture.wvu.edu/>

School of Natural Resources: The School of Natural Resources incorporates a broad range of academic programs in forestry and natural resources including Energy Land Management, Forest Resource Management, Recreation Parks and Tourism Resources, Wildlife and Fisheries Resources, and Wood Science and Technology. The School also includes Resource Economics and Management. Together the programs seek to provide students with a foundation in critical thinking and planning to help ensure sound stewardship and sustainability for our natural resources. Website URL: <https://naturalresources.wvu.edu/>

School of Design and Community Development: This School includes Agricultural & Extension Education, Design Studies, Landscape Architecture, and several other programs. The School's programs encourage innovative educational approaches, sustainable professional practices, and a commitment to improving quality of life and best uses of the land. Website URL: <https://designcomm.wvu.edu/>

iii. Business organization/administration/accounting

Davis College administrative staff as well as the University level Office of Sponsored Programs provide support in project budgeting, administration, financial accounting, and required reporting. At the College level, support staff include college level senior administrator, two communications managers, a graphic arts designer, three accounting assistants, and an Assistant Dean and Assistant Director for Business Affairs. With the various Schools of the College, professional support staff include five office administrators, eight administrative secretaries, three accounting assistants, one accounting clerk, one program specialist, and one travel coordinator. These staff positions all have varying responsibilities related to grant administration, accounting, and office management.

4. Personnel and Resources

i. Faculty and staff

Faculty and staff members with potential for future involvement with CESU sponsored programs are listed below.

School of Agriculture and Food

- Jason Hubbart: Director, Institute for Water Security and Science; watershed management
- James Thompson: Soil geography, soils in land management decisions. Research and Development Coordinator, National Soil Survey – Geospatial Research Unit.

School of Natural Resources

Energy Land Management

- Shawn Grushecky: energy land management, energy development

Forest Resource Management

- Sophan Chinn: Quantitative forest management; forest disturbance
- Kathryn Arano Gazal: forestry economics, urban forestry
- Charlene Kelly: forest soils, carbon and nutrient cycling
- David McGill: invasive species management, landowner perspectives
- Jamie Schuler: forest management, regeneration, silviculture, bio-feedstock production
- Kirsten Stephan: forest management, fire, carbon and nutrient cycling
- Nicolas Zegre: forest hydrology, Mountain Hydrology Laboratory

Natural Resource Analysis Center

- Paul Kinder: geospatial analysis, watershed restoration, drone technology
- Angela Hentz: drone technology, image processing
- Jacquelyn Strager: geospatial analysis, watershed analysis, geospatial technology training

Recreation, Parks and Tourism Resources

- Robert Burns: Director, School of Natural Resources, public lands planning and management
- Jinyang Deng: ecotourism, tourism planning GIS in recreation
- Kudzayi Maumbe: tourism/destination marketing and branding
- Chad Pierskalla: public resource land management, agricultural tourism
- Steven Selin: human dimensions, sustainable recreation, social network analysis
- David Smaldone: environmental and cultural interpretation

Resource Economics and Management

- Cheryl Brown: sustainability, agri-tourism
- Alan Collins: sustainability, natural resource economics
- Michael Strager: spatial analysis, spatial decision support

Wildlife and Fisheries Resources

- James Anderson: wetland ecology
- Donald Brown: wildlife population ecology and conservation
- John Edwards: wildlife biology, habitat selection
- Kyle Hartman: aquatic ecology, bioenergetics, population dynamics
- Christopher Lituma: bird population ecology, landscape conservation
- Todd Petty: fish population ecology, watershed management
- Christopher Rota: vertebrate ecology, applied statistics
- Amy Welsh: population genetics of fish and wildlife

Wood Science and Technology

- Joseph McNeel: Interim Leader, Appalachian Hardwood Center

WV Cooperative Fish and Wildlife Research Unit

- Stuart Welsh: fish ecology & genetics
- Petra Bohall Wood: avian ecology
- Pat Mazik: aquatic toxicology

School of Design and Community Development

- Peter Butler: Director, School of Design and Community Development; cultural landscapes and planning, community design, visualization
- Vaike Hass: landscape architecture, greenspace planning, stormwater management
- Elisabeth Orr: landscape architecture, cultural landscapes and preservation
- Charlie Yuill: landscape level analysis, remote sensing, regional design

ii. Facilities, centers and institutes providing support for research, technical assistance or educational activities:

Natural Resource Analysis Center: The Natural Resource Analysis Center (NRAC) is a multi-disciplinary research and teaching facility within the Davis College of Agriculture, Natural Resources and Design, originally established in 1990. For over 25 years, NRAC research, service, and teaching activities have complemented work within the College in many fields. Areas of expertise at NRAC include economic development and environmental sustainability, remote sensing, land cover mapping, landscape analyses, watershed-based analysis and applications, and GIS-based planning and decision-making

WV Cooperative Fish and Wildlife Research Unit (US Geological Survey): The Cooperative Research Units were created to enhance graduate education in fisheries and wildlife sciences and to facilitate research among natural resource agencies and universities on topics of mutual concern.

Geospatial Research Unit of the National Soil Survey Center (USDA Natural Resources Conservation Service): The Geospatial Research Unit (GRU) of the National Soil Survey Center (NSSC) supports the natural resource business needs of the United States Department of Agriculture's Natural Resources Conservation Service (USDA-NRCS) through the innovative use of geographic information sciences and related technologies.

Institute of Water Security and Science (IWSS): The Institute of Water Security & Science's mission is to develop sustainable solutions addressing contemporary water quality and quantity problems, while strengthening West Virginia's water security, and environmental, economic, social and cultural well-being, and broadening West Virginia University's water stewardship impact and prominence nationally and globally.

Westvaco Natural Resources Center: Created through the generous support of the MeadWestvaco Corporation, the Westvaco Natural Resources Center offers a scenic and spacious setting for meetings, conferences, and courses in the heart of the West Virginia University Forest.

West Virginia University Shared Research Facilities: WVU Shared Research Facilities offer high-technology research instrumentation to any researcher anywhere. Our experts will train you to operate the instruments or will run samples for you, all at reasonable hourly rate. Please see Attachment A for full description of the facilities.

5. Past Performance

Selected recent Federal awards for the Davis College:

Federal awards for faculty and staff listed in section (2) above are provided, including principal investigator(s), project title, funding source, effective dates, and total award (indirect and direct costs).

- Anderson, J. “West Virginia University Collaboration with the USDA Northeast Climate Hub”. USDA Forest Service. 2014-2019. \$13,000.
- Anderson, J. “Quantification of habitat restoration projects on wintering American Black Duck (*Anas rubripes*) carrying capacity in western Pennsylvania and West Virginia”. US DOI – US Fish and Wildlife Service. 2015-2018. \$104,299.
- Arano Gazal, K. “Use and effectiveness of social media in the consumers' forest products purchasing decision process. USDA Forest Service. 2017-2018. \$10,000.
- Basden, T. and J.M. Strager. “WV Manure Management software training program”. 2014-2017. \$40,000.
- Brown, D. “Influence of fire history and forest structure on terrestrial salamander abundance and diversity in the Central Appalachian region”. USDA Forest Service. 2016-2019. \$30,321.
- Burns, R. “Recreation use monitoring and evaluation: FY2011-2015 (Region 6 Round Three NVUM). USDA Forest Service. 2010-2016. \$1,698,779.
- Burns, R. “USFS Region 6 NVUM Round 3, Amendment 11”. USDA Forest Service. 2010-2017. \$1,698,779.
- Burns, R. “Recreation use monitoring and evaluation: FY2017-2021 (Region 6 Round Four NVUM). USDA Forest Service. 2017-2018. \$1,698,779.
- Burns, R. “Cooperative Agreement between National Park Service and WVU Research Corporation”. US DOI - National Park Service. \$2011-2019. \$12,000.00.
- Burns, R. “Developing a student-centered visitor use management research program: ICMBio Parks and Protected Areas in the Amazon Region of Brazil”. USDA Forest Service. 2013-2019. \$372,041
- Chinn, S. “Post-fire restoration and management of young plantations in the Sierra Nevada”. USDA Forest Service. 2017-2019. \$105,500.
- Chinn, S. “Modeling site index of Red Spruce (*Picea Rubens*) within a changing climate. USDA Forest Service. 2017-2020. \$20,000.
- Deng, J., S. Selin, and C. David. “NVUM participating agreement with Chequamegon Nicolet National Forest”. USDA Forest Service. 2016-2017. \$36,694.

- Edwards, J. “A joint position in wildlife management shared by the USDA Forest Service and the West Virginia University Division of Forestry & Natural Resources”. USDA Forest Service. 2014-2019. \$150,000.
- Edwards, J. J.H. Wimsatt, S.F.Owen. “Ecological correlates of tick abundance on Fort Drum Military Installation (CESU). US DOI – US Army Corps of Engineers. 2015-2017. \$308,344.
- Edwards, J., A.B. Welsh, S.F. Owen. “Correlates of tick abundance and strategies to reduce Lyme disease transmission on Fort Drum Military Installation (CESU). US DOI – US Army Corps of Engineers. 2017-2018. \$109,275.
- Fletcher, J., Kinder, P., Collins, A., et al. “Davis College Cooperative Agreement”. 2015-2019. Natural Resources Conservation Service. \$824,769. Selected sub-tasks under this agreement are listed below:
 - Anderson, J. “Evaluating wetland functions and ecosystem services in West Virginia wetlands. Natural Resources Conservation Service. \$127,800.
 - Collins, A. “Assessment of the distribution of NRCS assistance programs in West Virginia and strategic enhancement of future outreach efforts”. Natural Resources Conservation Service. \$50,100.
 - Collins, A., M. Knights, D. Singh-Knights. “Appraisal of market values for real properties plus evaluation of economic impacts of mineral rights and leasing on agricultural land values in West Virginia”. Natural Resources Conservation Service. \$53,000.
 - Kinder, P. “Revisiting poultry litter issues in the Potomac drainage of West Virginia”. Natural Resources Conservation Service. \$50,000.
 - Griggs, T., Kelly, C., Freedman, Z. “Prescribed grazing impacts on grassland rooting and soil microbial population dynamics: Implications for soil organic matter development and nitrous oxide emissions”. Natural Resources Conservation Service. \$123,539.
 - Skousen, J., McDonald, L., Pena-Yewukhiw., Thompson, J. “Soil Health of Reclaimed Mine Soils” Natural Resources Conservation Service. \$68,897.
 - Verlinden, S., Waterland, N., Jett, L. “Comprehensive Strategy for Maximizing High Tunnel Efficiency and Profit for Growers in West Virginia”. Natural Resources Conservation Service. \$124,769.
- Grushecky, S. “Supporting informational outreach for the wood education and resource center. USDA Forest Service. 2016-2018. \$20,000.
- Hartman, K. “Assessment of spatial and temporal variability in stream habitat and its influence on Brook Trout population dynamics: Long-term and short-term studies.” USDA Forest Service. 2012-2017. \$15,000.
- Hartman, K. “Fish use of Mississippi River dredge and disposal sites”. US DOI – US Geological Survey. 2015-2017. \$79,712.
- Kinder, P. “Davis College Cooperative Agreement-Phase II”. Natural Resources Conservation Service. 2018-2022. \$1,125,000.
 - Hubbard, J.- “Hydrological monitoring infrastructure at Reymann Memorial Farm”. \$208,560.
 - Kinder, P., Andress, L. “Creation and Application of A Geographically based Framework to Identify Barriers to Food Security by Region in West Virginia”. \$87,336.

- Wilson, M. “Forage Systems Efficiency and Behavior Analysis Infrastructure Development”. Natural Resources Conservation Service. \$122,009.
 - Kinder, P.- “Habitat Beyond Boundaries”. \$225,000.
- Kinder, P. “Aquatic Resource Data Stewardship and Analysis for the New River Gorge National River, Gauley River National Recreation Area and Bluestone National Scenic River in West Virginia”. US DOI – National Park Services. \$89,602.
- Mazik, P. “Indicators of endocrine disruption in the Chesapeake Bay Watershed”. US DOI - US Geological Survey. 2015-2019. \$317,868.
- Mazik, P. “Chesapeake Bay priority ecosystems fish health studies molecular pathology”. US DOI - US Geological Survey. 2015-2020. \$915,920.
- Mazik, P. “Support of chemical sampling for sources, transport and distribution of endocrine disrupting chemicals (1C) of the Chesapeake Bay Endocrine Disrupting Chemicals (EDC) Science Plan. US DOI - US Geological Survey. 2016-2017. \$66,606.
- McGill, D.” WV Restoration Venture: The Cheat, Potomac, & Tygart landscape project - Networking peer-to-peer”. USDA – Forest Service. 2016-2021. \$59,541.
- McNeel, J. and D. Dewitt. “Fostering an administrative partnership between WVU and the Northeastern Area Association of State Foresters”. USDA – Forest Service. 2012-2017. \$462,847.
- Petty, J.T. and P. Mazik. “Brook Trout modeling: A general framework and application to the Upper Susquehanna”. US DOI US Geological Survey. 2015-2016. \$44,238.
- Pierskalla, C. “White Mountain National Forest National Visitor Use Monitoring Project”. USDA Forest Service. 2014-2017. \$80,827.
- Rota, C. “Survival and reproduction of Eastern Wild Turkeys in northeastern South Dakota”. US DOI – US Fish & Wildlife Service. 2016-2019. \$154,376.
- Schuler, J. “Modeling stand development in a mixed species hardwood forest as affected by fertilization and liming”. USDA Forest Service. 2015-2018. \$22,000.
- Schuler, J. “Red Spruce response to overstory hardwood release treatments. USDA Forest Service. 2015-2018. \$35,000.
- Selin, S. “NVUM Cost-reimbursement agreement with GW-JEF National Forest”. USDA Forest Service. 2015-2017. \$110,487.
- Selin, S. “Managing for sustainable recreation outcomes across the National Forest System, A Critical analysis”. USDA Forest Service. 2017-2022. \$39,912.
- Smaldone, D. “NPS Northeast Region Public Engagement Evaluation.” US DOI National Park Service. 2012-2017. \$2,800.
- Stephan, K. “The role of tree and herb layer nitrogen metabolism in watershed-level nitrogen retention in an Appalachian hardwood forest. USDA Forest Service. 2017-2022. \$6,000.
- Strager, M., P. Ziemkiewicz, T. Petty, E. Merriam. “Quantifying the success and long-term ecological and socioeconomic benefits of watershed-scale acid mine drainage remediation efforts within West Virginia”. US Department of Interior. 2016-2018. \$199,960.
- Strager, M. “Predicting fire severity and impacts to ephemeral and intermittent streams after large-scale prescribed fire”. USDA Forest Service. 2013-2016. \$26,000.
- Strager, M. “Mapping fluvial landforms in floodplains related to ecosystem functions.” US Geological Survey. 2014-2015. \$40,000.

- Thompson, J. “Tools for guiding Red Spruce restoration: Species distribution modeling to map forest restoration potential.” USDA Forest Service. 2016-2018. \$75,000.
- Thompson, J. “Predictive soil mapping and data mining to develop a scalable framework for soil geographic knowledge.” USDA Natural Resources Conservation Service. 2013-2016. \$75,000.
- Thompson, J. “Soils2026: Developing the next generation of soil information products for the United States (CESU)”. USDA Natural Resources Conservation Service. 2016-2018. \$70,000.
- Thompson, J. and K. Donaldson. “USDA CarbonScapes, Phase II: A national look at carbon landscapes and meeting place for the USDA inventory and modeling...” USDA Natural Resources Conservation Service. 2016-2018. \$129,000.
- Welsh, A. and D. Michael. “Source population assignment of Lake Sturgeon in Lake Superior”. US DOI – US Fish and Wildlife Service. 2015-2017. \$185,408.
- Welsh, A. “Development of a white-tailed deer genetic database for the forensic identification of poached individuals”. US Department of Justice. 2015-2017. \$100,000.
- Welsh, S. B. Douglas, A. Welsh, J.M. Strager, D.A. Cincotta, I. Gibson, P. Angermeier, C. L. Burcher. “Genetic and landscape level threat assessments and status review of the Candy Darter (*Etheostoma osburni*)”. United States Geological Survey Science Support Partnership. 2017-2018. \$71,100.
- Wood, P. “Aerial surveys for Golden Eagles: Identifying sources of bias and developing effective survey methods (CESU)”. US DOI National Park Service. 2015-2017. \$127,179.56.
- Wood, P., Brown, D.J., Park, Y. “Effects of Imidacloprid treatment of Hemlocks on aquatic ecosystems: Is the cure worse than the disease?” US DOI- US Geological Survey. 2017. \$148,602.
- Yuill, C. B. “Multi-scale analysis of wildfire combustion processes in open-canopied forests”. USDA Forest Service. 2017. \$44,800.
- Ziemkiewicz, P. T. Petty, R. Thomas, J. Anderson, N. Zegre. “Environmental STEM research program: WVU/BSA Bechtel Summit”. US Geological Survey. 2016-2018. \$271,200.

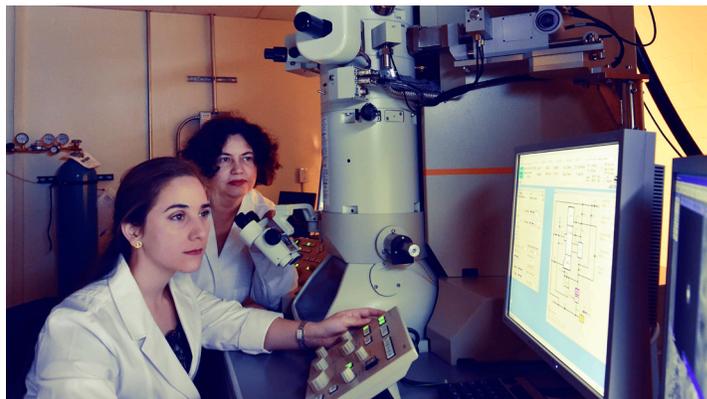
Davis College Existing Cooperative Agreements

The Davis College has an existing cooperative agreement with the Natural Resources Conservation Service which has funded a number of smaller cooperative research efforts between specific researchers within the College and the NRCS.

The School of Natural Resources has existing cooperative agreements with federal land management agencies:

- National Park Service’s Rivers, Trails, and Conservation Assistance Program Cooperative Agreement (West Virginia Field Office)
- West Virginia Cooperative Fish and Wildlife Research Unit Agreement with the Biological Resources Division of USGS and US Fish and Wildlife Service.

WVU SHARED RESEARCH FACILITIES



West Virginia University Shared Research Facilities offer high-technology research instrumentation to any researcher anywhere. Our experts will train you to operate the instruments or will run samples for you, all at reasonable hourly rates. Whether you are a WVU faculty or staff member or student, or you a researcher with another organization in academia or the public or private sectors, we welcome you to take advantage of one or more of our four facilities.

Website

srf.wvu.edu

Facilities

- ✓ **BioNano Research Facilities (BNRF)** include a ThermoFisher Q Exactive Mass Spectrometer with Orbitrap useful for drug discovery, proteomics, environmental and food safety, clinical research and forensic toxicology. BNRF also offers two inverted fluorescent microscopes with and without a camera, a synchronized video fluorescent microscope, and 1-D and 2-D electrophoresis systems with a CHEMIDOC MP imaging system. BNRF also offers BioPharma Finder Mass Informatics software for protein characterization.
- ✓ **Cleanroom Facilities** include two cleanrooms. The Cleanroom Facilities in the Engineering Sciences Building of the Statler College of Engineering and Mineral Resources are designed for fabricating electrical and photonic devices. There are 2,100 square feet of clean space, including class 100, class 1,000 and two class 10,000 rooms with photo- and e-beam lithography, wet-chemical processing, metallization and deposition, reactive ion etching, thermal processing and sample packaging. White Hall's Cleanroom Facilities, located in the Eberly College of Arts and Sciences' Department of Physics and Astronomy on the downtown area of campus, consist of one class 1,000 room and one class 10,000 room with photolithography, deposition, MBE and wafer dicing capabilities.
- ✓ **Materials Characterization Facilities** are available in the Engineering Sciences Building and the Engineering Research Building in the Evansdale area of campus and the Chemistry Research Building and White Hall, in the downtown area of campus. The collection includes three XRD instruments with separate configurations, an XPS, a Raman Spectrometer, FTIR, a white light ellipsometer, two AFMs, an optical profiler and a confocal microscope. The instruments elucidate the proportion and locations of atoms that make up the molecules of a variety of materials such as rock cores, batteries, sensors and photovoltaic cells.
- ✓ **Electron Microscope Facilities** are located in the Engineering Research Building on the Evansdale area of campus. The facilities allow structural analyses of different materials from bulk samples to biologicals. Major instruments that allow scientists to "see" their samples include two scanning electron microscopes to magnify samples from 25X to 1,000,000X and a transmission electron microscopy to magnify samples from 2,000X to 1,500,000X. A precision polishing system, a substrate dicing saw, a CO₂ critical point dryer, an ultramicrotome ultracut E, metallurgical microscope and a Denton Desk V sputter are used to prepare samples on-site.