MASH Mission & Scope

MISSION & SCOPE

MASH will support the CHIPS and Science Act to enhance America's strength in semiconductors and microelectronics and promote economic development.

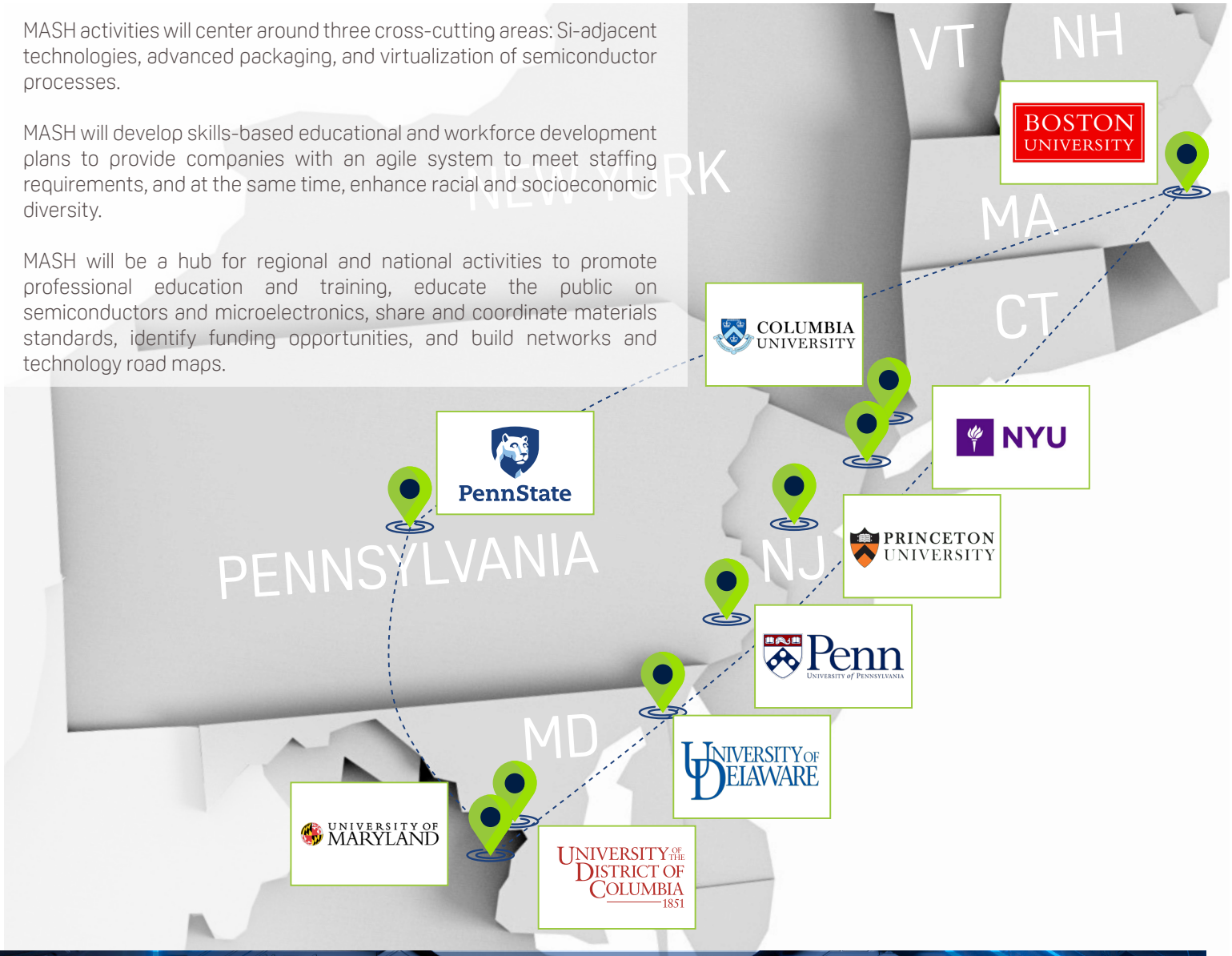
The goal of MASH is to create the world's largest nanofabrication, packaging, and characterization facility by linking and enhancing the facilities in the region. The MASH "distributed" network of facilities will support technology transition to manufacturing and offer redundancy of resources and immediate access to a huge amount of technical expertise in semiconductors.

MASH will focus on helping the semiconductor industry to transition materials into systems, which is a critical industrial need of many emerging applications such as advanced communications, non-volatile memory, More than Moore devices, Industrial Internet of Things, artificial intelligence, edge computing, wireless communications, quantum devices, environmental sustainability, and materials and substrates.

MASH activities will center around three cross-cutting areas: Si-adjacent technologies, advanced packaging, and virtualization of semiconductor processes.

MASH will develop skills-based educational and workforce development plans to provide companies with an agile system to meet staffing requirements, and at the same time, enhance racial and socioeconomic diversity.

MASH will be a hub for regional and national activities to promote professional education and training, educate the public on semiconductors and microelectronics, share and coordinate materials standards, identify funding opportunities, and build networks and technology road maps.



MASH Mid-Atlantic SEMICONDUCTOR HUB

UNIVERSITY OF THE DISTRICT OF COLUMBIA 1851

UNIVERSITY OF THE DISTRICT OF COLUMBIA (UDC) FACILITIES RELATED WORKFORCE DEVELOPMENT PROGRAMS

UDC is the nation's only urban land grant university located in the former National Bureau of Standards (present National Institute of Standards and Technology, NIST) in the Washington DC area within a five-mile radius from Capitol Hill. UDC is an HBCU that comprises a community college (UDC-CC) and main campus jointly offering two-year associate degrees to PhD-level STEM workforce training focusing on underrepresented communities.

MSDL: molecular spintronics

MOLECULAR SPINTRONICS DEVICE LABORATORY (MSDL)

This laboratory focuses on solving technological challenges in developing commercially viable molecular spintronics devices harnessing molecular quantum properties and spin properties of electrons. MSDL houses semiconductor device technology-related resources, including a class 1000 clean room, maskless aligners like lithography tools, several sputtering machines, and dry and wet etching. MSDL supports several doctoral research, ~50 UDC-CC, and ~40 undergraduate students attending Nanotechnology training courses. MSDL is leading the mass-producible magnetic tunnel junction-based molecular spintronics (MTJMSD) field, resulting in five non-provisional patent applications and national and international collaborations. MSDL is reputed to run clean room and nanotechnology resources with negligible operating costs for long-term sustainability.

CONTACT: Dr. Pawan Tyagi, ptyagi@udc.edu

MNL: microscopy

MICROSCOPY AND NANOFLUIDIC LABORATORY

This laboratory houses high a Scanning Electron Microscope with a Focused Ion Beam and an Industry grade Keyence Microscope for quantitative material analysis. This laboratory is also actively researching nanoscale microfluidic channels for diverse applications. This laboratory offers dedicated training for UDC graduate and undergraduate students in the field of microscopy-based material characterization.

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NML: nanoscale measurement

NANOSCALE MEASUREMENT LABORATORY (NML)

NML houses a wide range of nanoscale property and device testing resources, including a remote console to enable real-time access to Penn State material testing capabilities such as TEM. NML is equipped with AFM, Magnetometer, Ferromagnetic Resonance, Cryogenic transport testing, and semiconductor device parameter analyzer. NML has been a major support to UDC STEM faculty starting their research and pursuing grants. NML is the tentative site for UDC's Museum of Nanotechnology in the Washington DC area for engaging the K-PhD audience in outreach related to semiconductor devices and nanotechnology. NML supports ABET-accredited electrical and mechanical engineering undergraduate students' research training, producing a diverse workforce. .

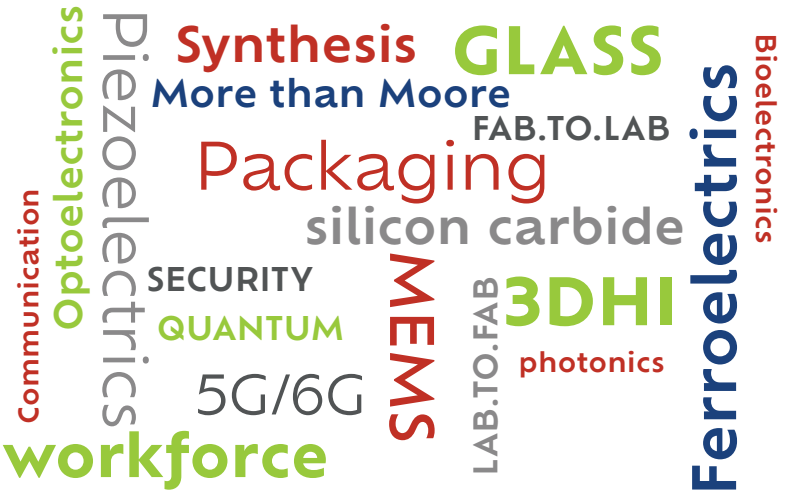
CONTACT: Dr. Pawan Tyagi, ptyagi@udc.edu

MTML: thermal management

MULTISCALE THERMAL MANAGEMENT LABORATORY

This laboratory innovates novel solutions for heat management in diverse areas, from computers to large-scale space vehicles. Several additive manufacturing (AM) technologies, such as EOS M280 Laser metal sintering machine and 3D printing of electronic circuits, are employed for research and workforce training in materials and system development for electronic packaging and thermal management. This laboratory also possesses atomic layer deposition and state of thermal property testing resources and actively researches with several NASA and NAVY-related federal organizations.

CONTACT: Dr. Jiajun Xu, jiajun.xu@udc.edu



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KEY MASH CONTACTS

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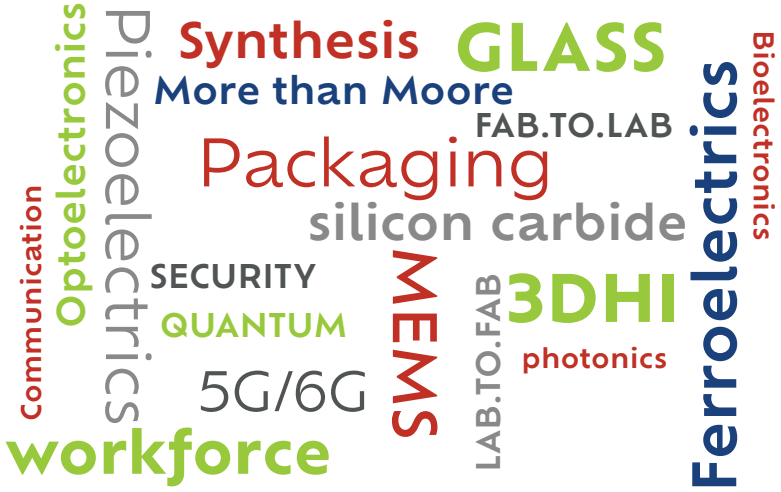

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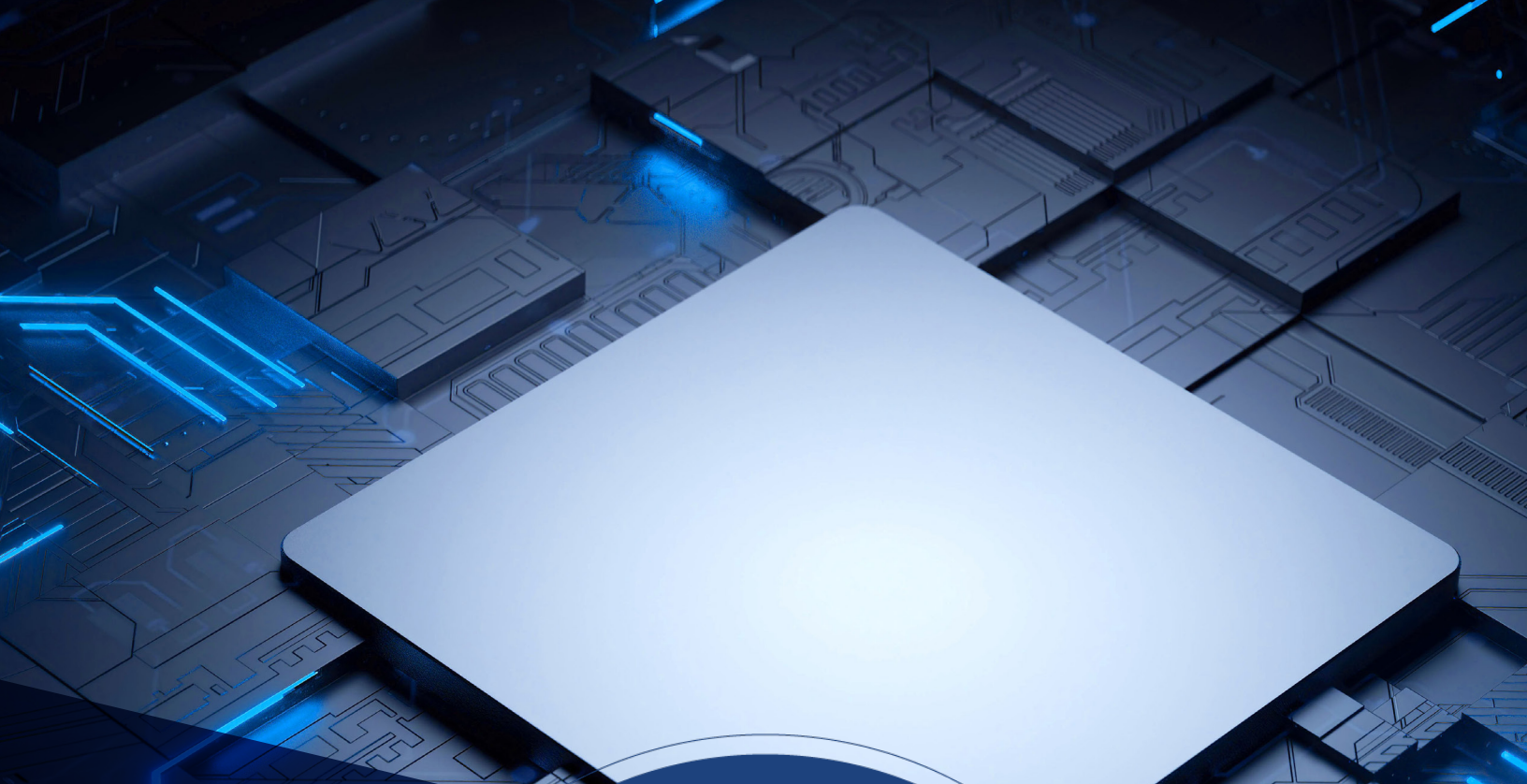

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Partnering for a Strong American Semiconductor Future