



Mansour Mortazavi, PhD

Pioneering Semiconductor Materials

Driving Sustainable and High-Performance Technology through Advanced Research at UAPB

Dr. Mansour Mortazavi, Vice-Chancellor of Research Innovation and Economic Development at the University of Arkansas at Pine Bluff (UAPB), is a pioneering force in semiconductor research and workforce development. A Professor of Quantum Optics, Arkansas Research Alliance Fellow, and Director of the Lasers and Nano-Science Laboratories, Dr. Mortazavi has significantly contributed to cutting-edge technologies in nanoelectronics, thin-film semiconductors, and quantum materials. These materials have unique properties that make them useful for high-tech applications, from flexible electronics to high-speed, low-energy computing.

Dr. Mortazavi's research focuses on a range of innovative materials that are crucial for creating the next generation of sustainable, high-performance semiconductor devices. Under his leadership, UAPB has become a leading HBCU in semiconductor research, equipping a diverse range of students to become key players in the technology sector.

The Challenges

The main challenge in developing high-performance semiconductor devices—like lasers, modulators, photodetectors, and infrared cameras—is making them more efficient while reducing their production costs. Creating these devices from advanced materials is difficult and expensive but essential to meeting the growing demands of modern semiconductor research.



These devices need detailed examination using advanced, specialized tools operated by highly skilled experts. This process is costly and requires precision, but it's essential for understanding the fundamental physics behind the materials and making these technologies practical for everyday applications.

The Solutions

To address the complexities of advancing semiconductor devices, Dr. Mortazavi's Advanced Physics Laboratories at UAPB are equipped with specialized tools to analyze the optical, electrical, and magnetic properties of cutting-edge materials like group IV, III-V, perovskites, and 2D materials. These high-precision instruments allow researchers to uncover ways to improve device efficiency and reduce costs by precisely measuring how materials perform under different conditions.

Beyond research, the lab provides practical training for HBCU students, equipping them with sought-after skills in semiconductor technology. This hands-on experience ensures they're ready to meet industry demands, addressing workforce needs by producing skilled graduates who can drive future innovations in tech. Through these initiatives, UAPB advances semiconductor research and contributes to workforce development, fostering the next generation of leaders in science and technology.

Funding

Dr. Mortazavi has secured funding from several US. Federal agencies such as Department of Defense (DoD), the Department of Energy (DoE), NASA'S Established Program to Stimulate Competitive Research (NASA-EPSCoR), and the National Science Foundation (NSF) to support research in semiconductor technology, materials science, and workforce development. He does collaborative research with MonArk Quantum Foundry in partnership with Monark State Universities. Energy Frontier Research Center (EFRC) and Energy-efficient Electronics, Photonics with 2D-Materials and Integrated Technologies (SEEP-IT) are collaborative projects with several US universities and national labs to explore novel semiconductor properties at the atomic scale.

Next Steps

Looking ahead, Dr. Mortazavi's lab seeks support to advance its research capabilities by expanding its infrastructure with more sophisticated optical measurement systems. These tools are essential for enabling the lab to conduct highly precise analyses, allowing researchers to observe and measure tiny interactions and performance nuances within semiconductor materials. With this enhanced level of detail, the lab can improve the efficiency and durability of materials used in critical devices, from high-resolution lasers and photodetectors to next-generation display technologies.

This investment is not only about precision; it's a pathway to groundbreaking discoveries in sustainable technology. With a deeper understanding of material behavior, the lab can unlock methods for creating energy-efficient semiconductors that require fewer resources. The impact of this research is substantial, supporting the development of advanced technologies that meet the growing demands of electronics, photonics, and renewable energy sectors. As these technologies evolve, Dr. Mortazavi's lab is poised to play a key role, providing essential research insights and workforce training to propel the field forward and address global challenges. Support for these upgrades would enable UAPB to continue driving innovation at the intersection of science, sustainability, and workforce development.

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