# Arkansas Materials Institute

Hugh Churchill
Director
479-575-7235
Email: hchurch@uark.edu

Arkansas Materials Institute website (https://materials.uark.edu/)

## Mission

The Arkansas Materials Institute advances the future of materials science and engineering by fostering interdisciplinary education, cutting-edge research, and world-class facilities. As a vital contributor to the University of Arkansas' mission, the Institute provides transformative educational experiences, cultivates innovation, and strengthens the STEM workforce. Through collaboration among students, faculty, and industry partners, we translate foundational materials discovery into real-world solutions that address global challenges bringing impactful research to Arkansas and the world.

## Vision

To shape a future where interdisciplinary materials innovation fuels discovery, transforms education, and enables sustainable solutions to the world's most pressing challenges, positioning Arkansas as a global driver of materials advancement.

## Research Impact

Faculty and students in the Arkansas Materials Institute break new ground by bridging traditional research areas and redefining them through the interdisciplinary field of materials science and engineering. As the research landscape continues to evolve, current key areas of growth include electronics and photonics, quantum materials, artificial intelligence, biosystems, and energy.

Five transformative areas drive the Arkansas Materials Institute research:

1. **Quantum:** Materials faculty advance quantum materials research through combined experimental and theoretical approaches, spanning crystal growth, quantum transport, low-dimensional systems, and device physics. Their work explores superconductors, topological and correlated materials, and quantum devices, uncovering emergent electronic, magnetic, and photonic phenomena. These efforts drive advances in computing, sensing, and energy technologies, positioning quantum materials at the forefront of innovation.
2. **Electronics and Photonics:** Faculty in materials science are pioneering advances in electronic and photonic materials that shape modern technology. Research spans nanoscale material synthesis and characterization, novel device fabrication, and integrated photonic architectures. The materials science research pursued here ultimately enables the semiconductor devices, communication infrastructure, medical diagnostics, environmental monitoring, and space exploration systems that underpin virtually every dimension of modern science, industry, and daily life.
3. **Artificial Intelligence:** Materials faculty are pioneering materials for artificial intelligence emulating brain-like behavior. Their research develops and integrates adaptive materials such as ferroelectrics to enable efficient learning and computation. These innovations support low-power, high-performance advanced AI hardware for edge computing, sensing, and data-intensive applications
4. **Energy:** Advanced materials research is driving next-generation energy solutions by enabling more efficient storage, conversion, and sustainability. Faculty are actively developing innovations in batteries, photovoltaics, catalysts, and lightweight materials to improve performance, reduce costs, and lower environmental impact. These efforts support cleaner energy systems, accelerate decarbonization, and power a resilient, sustainable future.
5. **Biosystems:** Faculty in Materials for Biosystems develop bioinspired and biohybrid materials and systems at the interface of materials science, engineering, and life sciences. Research advances biomaterials, drug delivery, tissue engineering, regenerative medicine, biointerfaces, and biotechnologies to improve human and animal health and develop sustainable solutions for food, agriculture, and the environment.