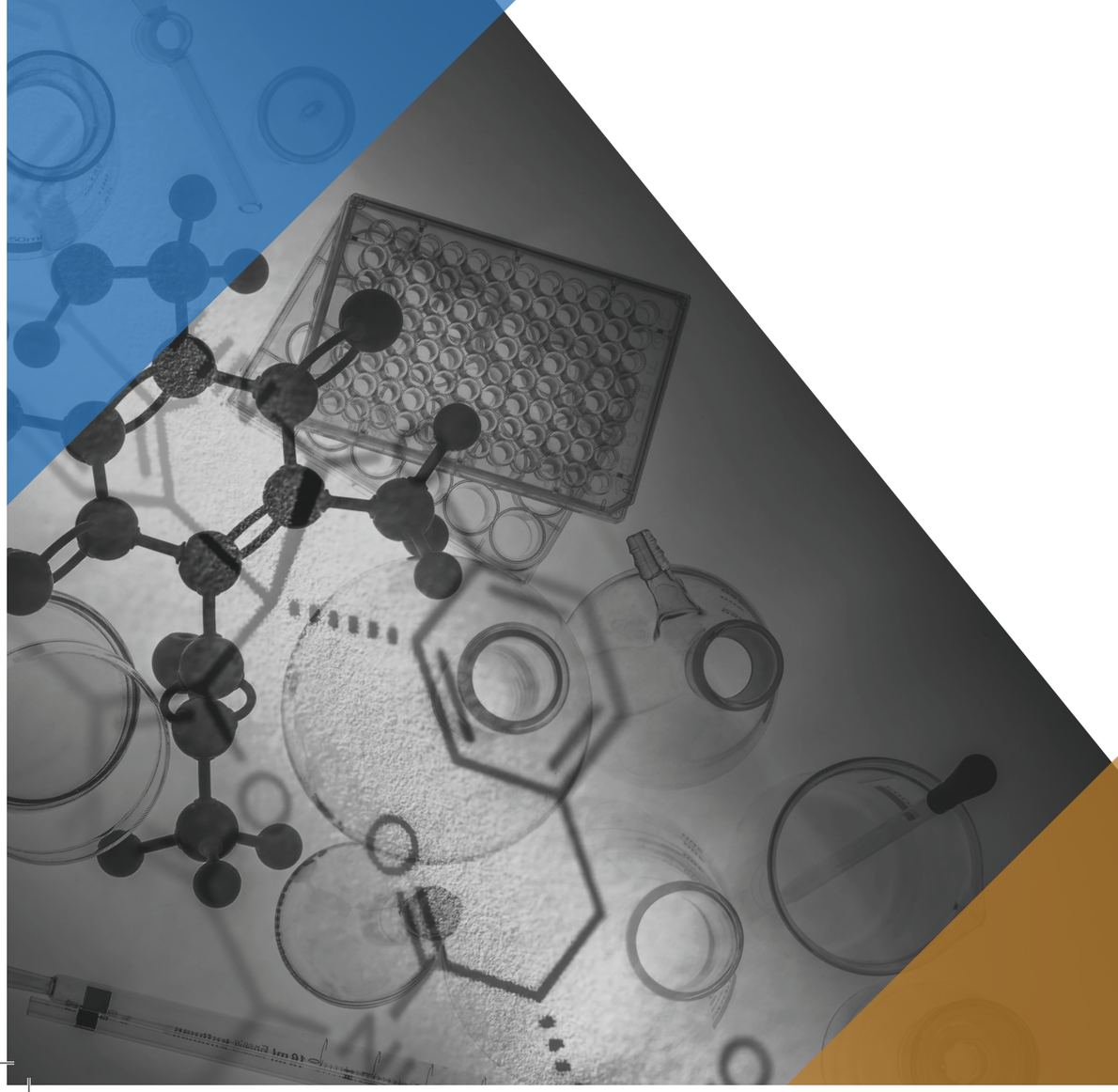
ALEPSCoR RII SCIENCE & TECHNOLOGY PLAN

APPROVED ON JULY 20, 2021



ALABAMA EPSCoR

ALABAMA EPSCOR 2021 RII S&T PLAN

Executive Summary

In 2017 Alabama EPSCoR (ALEPSCoR) worked with the Alabama Department of Commerce (DoC) to develop an economic development plan, "*Accelerate Alabama 2.0*". This State economic development plan *contained* an ALEPSCoR Science and Technology (S&T) plan describing the research and development (R&D) steps needed to achieve the economic goals of *Accelerate Alabama 2.0.*

More recently, in July of 2020, Alabama Governor Kay Ivey established, by Alabama Executive Order 720, the Alabama Innovation Commission (AIC), designed to stimulate economic growth in Alabama's innovation economy and tech-related industries. ALEPSCoR has developed a newly updated and modified **ALEPSCoR's 2021 Research Infrastructure Improvement (RII) S&T Plan** so that the new economic development goals and priorities of the Executive Order 720 inform and align with the R&D goals and steps of our new ALEPSCoR 2021 RII S&T plan. To this end, our new ALEPSCoR 2021 RII S&T plan will focus on developing new R&D technologies to support "*Alabama's most prominent industries,*" listed in Executive Order 720 as: "*automotive, aerospace, chemicals, agriculture, forest products, information technology, energy, metals, plastics, and bioscience.*"

The ALEPSCoR 2021 S&T plan establishes additional state-wide R&D priorities to develop ***additional emerging technologies*** where Alabama can develop ***future successful new industries*** and expand existing ones. Beginning in 2020 through 2021, ALEPSCoR performed a comprehensive analysis of the strengths and weaknesses of the Alabama R&D research enterprise, and each Alabama major research institution was asked to provide a comprehensive categorized list of current research capabilities and strengths at their institutions.

To determine the most promising future R&D technologies, a Request for White Papers / Pre-proposals was published in December of 2019 requesting proposed new research topics where Alabama could establish or strengthen national leadership. Nine pre-proposals on major research initiatives were received. National technical experts evaluated these submissions to determine the most promising areas for future Alabama leadership. These recommendations were considered by the full ALEPSCoR Steering Committee including the Vice Presidents for Research of the eight Alabama Ph.D. granting institutions and representatives from state government. The decision was made to make the primary focus of Alabama EPSCoR's RII resources in ***Plasma Science***. Alabama is unique in its close linkage of industry, commercialization, national interest, and academia in plasma science, and it provides the most promising national leadership and new commercialization opportunities.

I. BACKGROUND

The America Creating Opportunities to Meaningfully Promote Excellence in Technology, Education, and Science (America COMPETES) Act was enacted in 2007 and reauthorized in 2015. America COMPETES articulates the need for increased national attention to science, technology, engineering, and mathematics (STEM) education, research, and development. Alabama has long recognized the economic importance of encouraging growth in targeted STEM research areas for economic growth.

To advance economic growth in Alabama, an economic development strategic plan was developed in 2011 by the Alabama Economic Development Alliance called *Accelerate Alabama.*[1] The plan was created by Executive Order of Governor Robert Bentley, and chaired by Alabama Department of Commerce Secretary Greg Canfield.[2] *Accelerate Alabama* included ten identified targeted business sectors on which to focus state efforts.

In coordination and in support of the *Accelerate Alabama* economic development strategic plan, in 2016, Alabama EPSCoR (www.ALEPSCoR.org) developed the initial Alabama EPSCoR Statewide Science and Technology Roadmap (AESSTR). The AESSTR identified the targeted economic growth areas of *Accelerate Alabama*. This 2016 AESSTR plan was formally approved and endorsed by the Alabama EPSCoR Steering Committee on July 21, 2016 and subsequently adopted for the State of Alabama by the Alabama Department of Commerce in 2017. The Roadmap complemented *Accelerate Alabama* by identifying statewide research priorities and areas of research expertise across Alabama's universities and laboratories primed for targeted economic growth.

II. ALABAMA EPSCOR 2021 RII S&T PLAN

2.1 Motivation / Alabama Executive Order 720

In July of 2020, Alabama Governor Kay Ivey established, by Alabama Executive Order 720,[3] a major new initiative designed to stimulate growth in Alabama's innovation economy and tech-related industries. The overall purpose of the executive order was to establish a new state entity, the Alabama Innovation Commission (AIC).[3] The AIC (https://innovatealabama.org/)[4] was established to "support statewide entrepreneurship, rural businesses, research and development at existing companies, and support access to advanced technical skills that will drive a future workforce." The establishment of the AIC is a long-term effort to support statewide research, development, and entrepreneurship. The state-wide goals described in Alabama Executive Order 720 have been adopted as the primary goals and objectives for a **new** Alabama EPSCoR Research Infrastructure Improvement (RII) Science and Technology (S&T) plan. This was unanimously approved by the Alabama EPSCoR Steering Committee on July 20, 2021, and the signature page is provided on page 21 at the end of this document.

2.2 Overarching Goal and Specific Objectives of Alabama EPSCoR 2021 RII S&T Plan

According to Alabama Executive Order 720,[3] "*entrepreneurship and innovation are essential to the growth and competitiveness of Alabama's economy.*" Thus, the overarching **goal of the Alabama EPSCoR 2021 RII S&T Plan is to stimulate entrepreneurship and innovation through Research and Development (R&D) and to effect sustainable improvements in Alabama's research infrastructure, R&D capacity, and hence, its R&D competitiveness.** The specific objectives to reach this goal are informed by Alabama Executive Order 720[3] and are as follows:

1. Objective 1: Leverage Alabama EPSCoR research and development activities to foster innovation and commercialization in the state.
2. Objective 2: Develop existing and new R&D technologies to support Alabama's most prominent industries, which according to Executive Order 720 are in the following research areas: "*automotive, aerospace, chemicals, agriculture, forest products, information technology, energy, metals, plastics, and bioscience.*" [3]
3. Objective 3: Establish additional jurisdiction-wide research priorities to develop additional emerging technologies where Alabama can secure future success and expand existing ones.

2.3 Description of how Alabama's Economic Development Plan Priorities informs the Alabama EPSCoR 2021 RII S&T Plan

Alabama EPSCoR has worked hand-in-hand with the Alabama Department of Commerce over the years to align its S&T plan with the Alabama's Economic Development plan in order that the economic development plan priorities always inform the research priorities of the Alabama EPSCoR S&T plan. Alabama EPSCoR recognizes the importance of existing and emerging industries in developing a state-wide economic development plan. In 2017, Alabama EPSCoR collaborated with the Alabama Department of Commerce to develop a list of the eleven most crucial technology priority areas for the State of Alabama. This list of technology priority areas incorporated technologies that support existing well-performing industries in the State, as identified by the Alabama Department of Commerce, plus new technologies supporting emerging industries. These eleven technology priority areas were included in the Alabama EPSCoR S&T plan for Alabama and this S&T plan was incorporated in its entirety (see pages 54-89) in the 2017 new State Economic Development plan, "*Accelerate Alabama 2.0*"[5] that was formally adopted by the Alabama Department of Commerce.

Similarly, in this Alabama EPSCoR 2021 RII S&T Plan, we again used the economic development priorities outlined in Executive Order No. 720 to inform this updated version. We updated the 2017 economic development priorities of Accelerate Alabama 2.0 to reflect those in Alabama Executive Order 720. The current prominent industries outlined in that document are: **"*automotive, aerospace, chemicals, agriculture, forest products, information technology, energy, metals, plastics, and bioscience.*"**[3] These current prominent industries are clearly economic development plan priority areas for the state of Alabama, and inform our state S&T research priorities. As summarized in Objective 3 from Section 2.2, Alabama EPSCoR's 2021 RII S&T Plan Jurisdiction-Wide Research Priorities begin with R&D technologies that support ***current prominent industries*** as established in Alabama Executive Order 720 and described above. With some modifications and updates, these prominent industries were also identified in the 2017 Alabama Economic Strategic Plan, "*Accelerate Alabama 2.0.*"[5]

During 2020-2021, Alabama EPSCoR performed an updated analysis of the research strengths in the state, both those that support the current prominent industries (listed in Alabama Executive Order 720), and research strengths that also expand newer areas of research emphasis that show promise to establish new high growth industries. The results of this analysis led to Alabama EPSCoR's 2021 RII S&T Plan Jurisdiction-Wide Research Priorities (see Section 2.4 below, and the framework used to establish the new high growth research priorities (see Section 2.5 below).

2.4 Alabama EPSCoR 2021 RII S&T Plan Jurisdiction-Wide Research Priorities

Key Alabama EPSCoR research priority areas to support the current prominent industries described in Alabama Executive Order 720 include current prominent industries in Alabama Executive Order 720 are as follows.

- **Agricultural / Food Production**
  - Supporting "*agriculture*" prominent industries (see Section 2.7 for subtopics).
- **Automotive & Aerospace Technologies**
  - Supporting both "*automotive*" and "*aerospace*" prominent industries, previously called "Transportation" in *Accelerate Alabama 2.0* (see Section 2.7 for subtopics).
- **Biosciences / Biotechnology**
  - Supporting the "*bioscience*" primary industries (see Section 2.7 for subtopics).
- **Chemical / Petrochemical**
  - Supporting both "*chemicals" and "plastics*" prominent industries (see Section 2.7 for subtopics).
- **Energy**
  - Supporting "*energy*" prominent industries (see Section 2.7 for subtopics).
- **Forestry Products / Natural Resources**
  - Supporting "*forestry product*" prominent industries, previously called "Forestry Products" in *Accelerate Alabama 2.0* (see Section 2.7 for subtopics), expanded to include Natural Resources as an overarching title for the growing area of water research in our state. (See Section 2.5)
- **Information Technology and Cybersecurity**
  - Supporting "*information technology*" prominent industries (see Section 2.7 for subtopics).
- **Metals and Advanced Materials**
  - Supporting the "*metals*" and "*plastics*" prominent industries (see Section 2.7 for subtopics).

Although not explicitly listed as a prominent industry,[3] Advanced Manufacturing is vital for Alabama because it supports ***all*** of the current Executive Order 720 prominent industries.

- **Advanced Manufacturing**
  - Advanced Manufacturing uses innovative technologies such as Additive Manufacturing (often called 3D printing) to produce manufactured products more efficiently. For the *automotive industry*, 3D printing can provide lighter and stronger parts with much faster development cycles. For the *aerospace industry*, additive manufacturing is vital for engine development, as shown by the opening of a $50 million expansion[6] to the GE Aviation plant at Auburn, Alabama as a collaborating partner to the National Center for Additive Manufacturing Excellence (NCAME).[7] *Food industry* applications of 3D printing is expected to reach $425M by 2025[8] to selectively add new food ingredients and to improve food packaging. For the *biotechnology industries*, 3D printing can be used to create orthopedic implants, surgical instruments, and dental restorations.[9] For the *chemical industry*, 3D printing facilitates mass production and rapid prototyping and manufacturing.[10] For the *energy industry*, 3D printing could lead to much cheaper and more efficient solar panels.[11] For the *forestry industry* 3D printing can lead to high volume

production of specialized wood parts.[12] Advanced Manufacturing goes hand-in-hand with the *information sciences* industries, both depend on each other. Advanced manufacturing techniques make *advanced materials industries* possible.

A comprehensive analysis was performed in 2020 as part of a regular formative assessment of which ***future technologies*** hold promise for expansion or lead to vital new ***future prominent industries*** with the framework used to establish these most promising future technologies described in Section 2.5 below.

2.5 Alabama EPSCoR 2021 RII S&T Plan Framework to Guide Alabama use of R&D Infrastructure Improvement Resources

Alabama EPSCoR has a consistent state framework that has been used to periodically update Alabama EPSCoR's plan to optimally guide the use of R&D Infrastructure Improvement resources. This framework involves performing a comprehensive state analysis of the strengths and weaknesses of the Alabama research enterprise. A primary goal is to strengthen Alabama's research **and industrial** competitiveness, making input about state economic priorities vital.

Beginning in 2020 through 2021, Alabama EPSCoR performed a comprehensive analysis of the strengths and weaknesses of the Alabama R&D research enterprise. Each of the eight PhD granting Alabama EPSCoR core institutions, along with HudsonAlpha and Southern Research, provided a comprehensive categorized list of current research capabilities and strengths at their institutions. Summarized ICON maps of these research capacities are provided in **Section 2.7**, along with links to additional information. These research capability maps were used to determine Alabama research strengths and show where research is being conducted.

To determine the most promising future R&D technologies, Phase 1 Request for White Papers / Pre-proposals was published in December of 2019 requesting proposed topics for establishing Alabama as a research leader. Nine major research initiatives were received in 2020. The pre-proposals were shared with an outside reviewer that enlisted leading technical experts to evaluate these submissions and perform an initial down-select determination. The evaluation of these research topics continued through 2020 and 2021. These recommendations were considered by the full Alabama EPSCoR Steering Committee including the Vice Presidents for Research of Alabama eight Ph.D. granting institutions. The three most promising future R&D technologies were selected:

3. Water Resource Management, ranked as the third most vital future technology for Alabama. UA established the Alabama Water Institute[13] to support various water resources for our state, nation, and around the world. The Alabama Water Institute collaborates with the National Oceanic Atmospheric Administration's (NOAA) Office of Water Prediction at the National Water Center (NWC)[14] located on the UA campus. The NWC is a first-in-the-world facility that delivers water information and services to the nation to strengthen water forecast capabilities for flood and droughts, improve preparedness for water-related disasters, and inform water decisions at the local, state, and national level. UA's Dr. Prabhakar Clement won a NSF EPSCoR award[15] to host a national NSF EPSCoR Water Security Planning Workshop[16] at UA in March 2022 to discuss and develop novel ideas for solving water security problems relevant to EPSCoR states. Dr. Clement was also awarded a NSF EPSCoR RII Track 2 grant in 2020 to study groundwater depletion. Groundwater is especially important as it helps sustain surface water resources and freshwater usage; it is also essential to water-related industries in Alabama.

2. Nanotechnology was ranked as the second most vital future technology for future industrial growth in Alabama. This technology was determined to be vital for advanced aerospace[17] and automotive technologies,[18] energy,[19] advanced materials,[20] and plasma sciences. Because of its application to other priorities, it was selected as a focus area for future development.

Our analysis showed that nano-biotechnology was an especially promising future industrial area for Alabama, given nanotechnology strengths at all Alabama EPSCoR universities and biotechnology strengths in particular at UAB and several other Alabama EPSCoR universities. Some especially promising future technology areas include: i) drug/gene delivery nano-systems that simultaneously provide therapy to specific cancerous sites while assisting in diagnosis[21] based on nano-colloids and compartmentalized nanocarriers;[22] ii) emergent high accuracy bioimaging and biosensing technologies that operate over a uniquely wide electromagnetic spectrum[23] based on synthetic nanoparticles that mimic biochemical processes; iii) emergent technologies for cell and tissue engineering to produce the next generation cell encapsulation systems to deliver healthy cells or replacement tissue to damaged heart or other tissue; and iv) development of advanced technologies for 3D printing of porous biological scaffolds combined with and new molecular imprinting approaches that can be combined with the cells of the body to serve as templates for tissue regeneration.[24]

1. Plasma Science was ranked as the *most vital future technology* for future industrial growth in Alabama. The current CPU2AL Track 1 project[25] was funded by a $20M cooperative agreement with NSF EPSCoR. CPU2AL (Connecting the Plasma Universe to Alabama) studies low-temperature plasma (LTP) which has significant current and potential applications for the State of Alabama across numerous sectors including automotive and aerospace, healthcare[26] and agriculture. Major Alabama universities possess considerable expertise in LTP, thereby making Alabama unique in its close linkage of industry, commercialization, national interest, and academia.

In 2020, one such linkage of plasma, academia, and the national interest is related to the selection of Redstone Arsenal in Huntsville, Alabama as the preferred new headquarters for the U.S. Space Command. Of critical focus at the U.S. Space Command is communication, intelligence, navigation, and early missile detection and warning. Recently the work of a UAH CPU2AL scientist was featured in multiple articles[27,28,29] that describe important advances in space weather research which enables the ability to forecast the arrival of large solar disturbances.[30] These disturbances produce copious amounts of highly energetic particles that affect space-based assets (both military and civilian), degrading communications, global positioning, space situational awareness and overall safety of satellites, all a focus of the U.S. Space Command.

LTP impacts the semiconductor industry and in 2021, a global semiconductor shortage caused auto manufacturing delays in Alabama, and the shutdown affected employees. In the Alabama healthcare sector, LTP is now being used in the treatment of cancer[31] since it can selectively kill cancer cells without affecting normal healthy cells. For the Alabama agricultural sector, LTP preliminary studies have shown results in shortened seed germination times and greater yields with less impact on the ecosystem. Finally, LTP is now being used increasingly for sterilization processes as it is non-invasive and non-destructive. Applications include sterilization of hospital instruments, as well as food products[32] to eliminate salmonella and other dangerous pathogens from eggs and poultry.

2.6 AESSTR2 Pathways for Bringing Alabama EPSCoR Research Outputs and Outcomes to the Marketplace

A significant success story regarding Alabama EPSCoR research outputs and outcomes to the marketplace is the CPU2AL project. It is an integrated, statewide collaborative effort that seeks to understand, predict, and control the transfer of power from electromagnetic fields to electrons, ions, atoms, molecules, and surfaces, and chemical reactions in plasma and on surfaces in (LTP) environments. The CPU2AL project combines theory, modeling, and experimental validation of LTP and applies these to industrial applications with the goal of realizing the extraordinary potential of LTP science for transformative technological solutions that address societal grand challenge problems.

This knowledge can be used to develop new technologies for aerospace, advanced manufacturing and materials, medicine, agriculture, and food safety. Potential areas for commercial applications include super-hard materials, enhanced plant propagation, new prosthetics technology for amputees, and improvements in food disinfection and safety. The project shares resources and leverages partnerships among Alabama institutions and industries to strengthen the research capacity and build and train an inclusive workforce in plasma science.

Early in the program, this project began holding workshops with Alabama EPSCoR universities to identify and prioritize promising technologies for commercialization. They also established a commercialization committee, the Industry Liaison Board (ILB), to assess individual projects within CPU2AL for their commercialization potential, and to identify ways to "help" these projects develop. Some important CPU2AL industrial partners include: **Evonik Industries** (Birmingham, AL) worked with CPU2AL in the area of plasma treated biomaterials and medical polymers and has commissioned an advanced biomaterials facility in Birmingham; **Vista Engineering** (Birmingham, AL) has worked with CPU2AL in plasma synthesized wear-resistant coatings for increasing the longevity of dental and orthopedic implants. **Plasma Processes** and **ESI** (both in Huntsville, AL) have been engaged in student internships and providing hands-on training for the emerging Alabama plasma workforce.

Four recent CPU2AL projects have met or seeking commercialization success:

- Dr Yogesh Vohra at UAB, working with Evonics, led the Artificial Vascular Graft Project which was awarded a $906,458 grant by the Alabama Department of Commerce through the Alabama Research and Development Enhancement Fund (ARDEF) established by the Alabama Innovation Act (AIA) and administered by the Alabama Department of Economic and Community Affairs (ADECA). This grant allowed the Vascular Graft project to pursue commercialization opportunities.
- The Plasma Treatment of Turmeric Rhizomes Project, led by AAMU and UAH, is working with a commercial turmeric grower to investigate the feasibility of scaling-up of Atmospheric Pressure Plasma (APP) techniques to commercial levels by taking this from the lab to the farm.
- The Plasma Enhanced Chemical Looping Project is planning to demonstrate their novel reactor in 2021 and then apply for a patent.
- The Plasma Propulsion Technologies Project has tested five different System Requirement Review (SRR) designs to determine the best geometries for maximum engine performance.

Of the eight Alabama Ph.D. granting institutions in the state, five have existing tech transfer offices to assist faculty, staff and students protect and license aspects of their research for commercial development. These institutions include AU, UA, UAB, UAH, and USA.

2.7 Current Alabama Capabilities in Jurisdiction-wide Research Priorities

Those statewide research priorities identified in Section 2.4 and Section 2.6 were categorized as supporting the most promising future technologies and those supporting crucial current prominent technologies. They are:

R&D Technologies supporting most promising future industrial growth in Alabama:

1. **Plasma Science** (highest priority for future technologies)
2. **Nanotechnology** (next highest priority for future technologies)

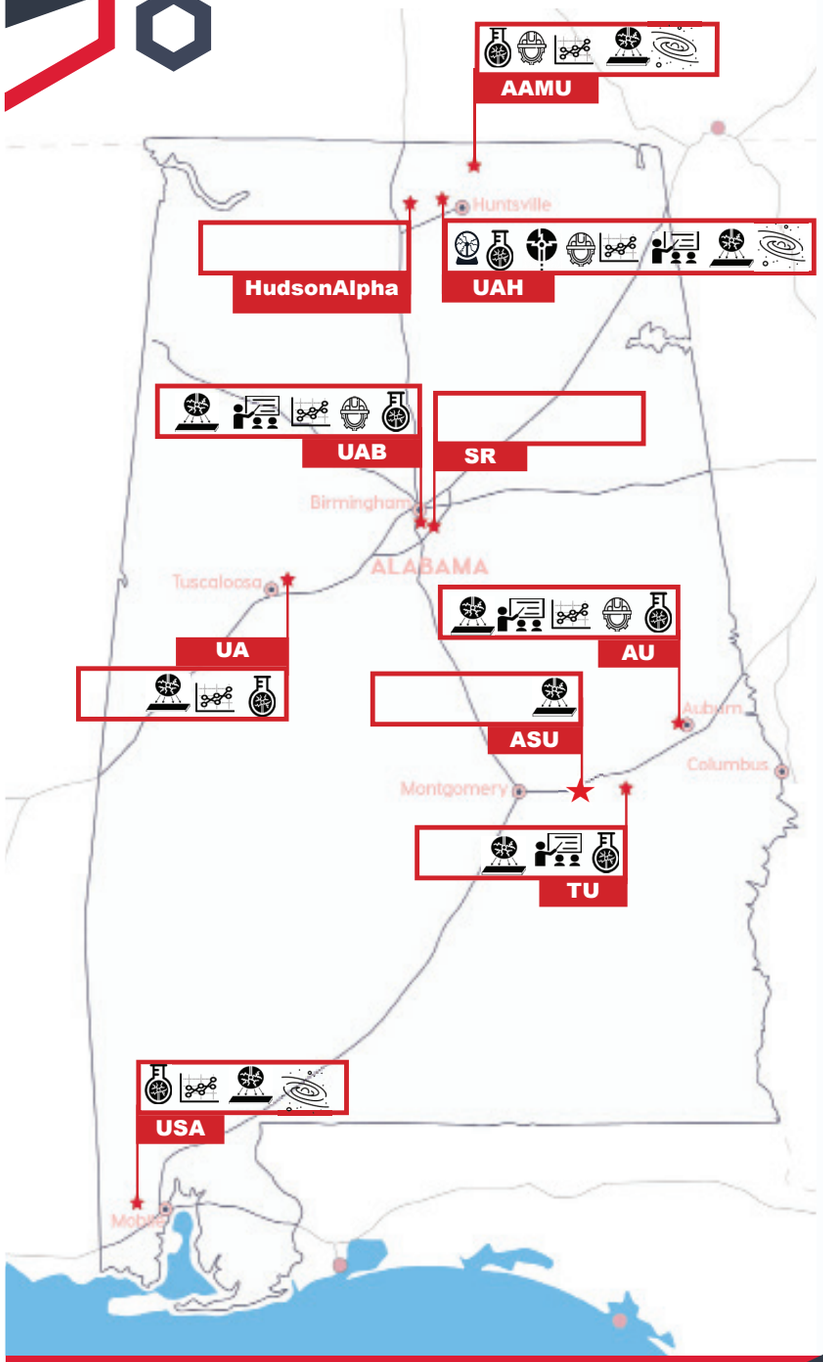
R&D Technologies supporting crucial current prominent industries (listed alphabetically)

3. Advanced Manufacturing
4. Agricultural / Food Production
5. Automotive & Aerospace Technologies
6. Biosciences / Biotechnology
7. Chemical / Petrochemical
8. Energy
9. Forestry Products / Natural Resources (including the new future growth technology area of *Water Resource Management*).
10. Information Technology & Cybersecurity
11. Metals & Advanced Materials

Recently updated maps, outlining each of the Alabama capabilities above, are provided on pages 9-19. These maps show the location all of the main research areas with subcategories represented by easy-to-understand icons. Further detail on the subcategories of the main research areas provides a tertiary set of data from the universities and industries compiled into an Excel document. This is a living document regularly updated and maintained by ALEPSCoR and is available at https://alepscor.org/updated-website-spreadsheet/.

With the encouragement of the Alabama Department of Commerce, Alabama EPSCoR developed an interactive version of the research capability maps allowing access to the more detailed research capabilities found in the Excel document. These digital maps are available by county and congressional district, making it easy to access research capabilities for a given area. The purpose of these maps is to foster a networking platform for business, government, and collaborating universities. Businesses can now find and recruit workers in specified fields, select sites for new businesses to utilize an educated workforce; collaborate with students and faculty on research projects to foster job creation and find university-based testing resources. State government can discover the types of research occuring across the state and find experts in specific areas. Students can pinpoint faculty with expertise in areas of future study. Faculty can locate potential collaborators. The interactive database can be found at https://alepscor.org/alabama-research-targets/.

Plasma



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AAMU
Alabama A and M University

AU
Auburn University

TU
Tuskegee University

UA
University of Alabama

UAB
University of Alabama at Birmingham

UAH
University of Alabama in Huntsville

USA
University of South Alabama

SR
Southern Research

ASU
Alabama State University

Experimental Plasma Science

Fundamental Plasma Physics

Engineering

Theory/ Computation/ Modeling

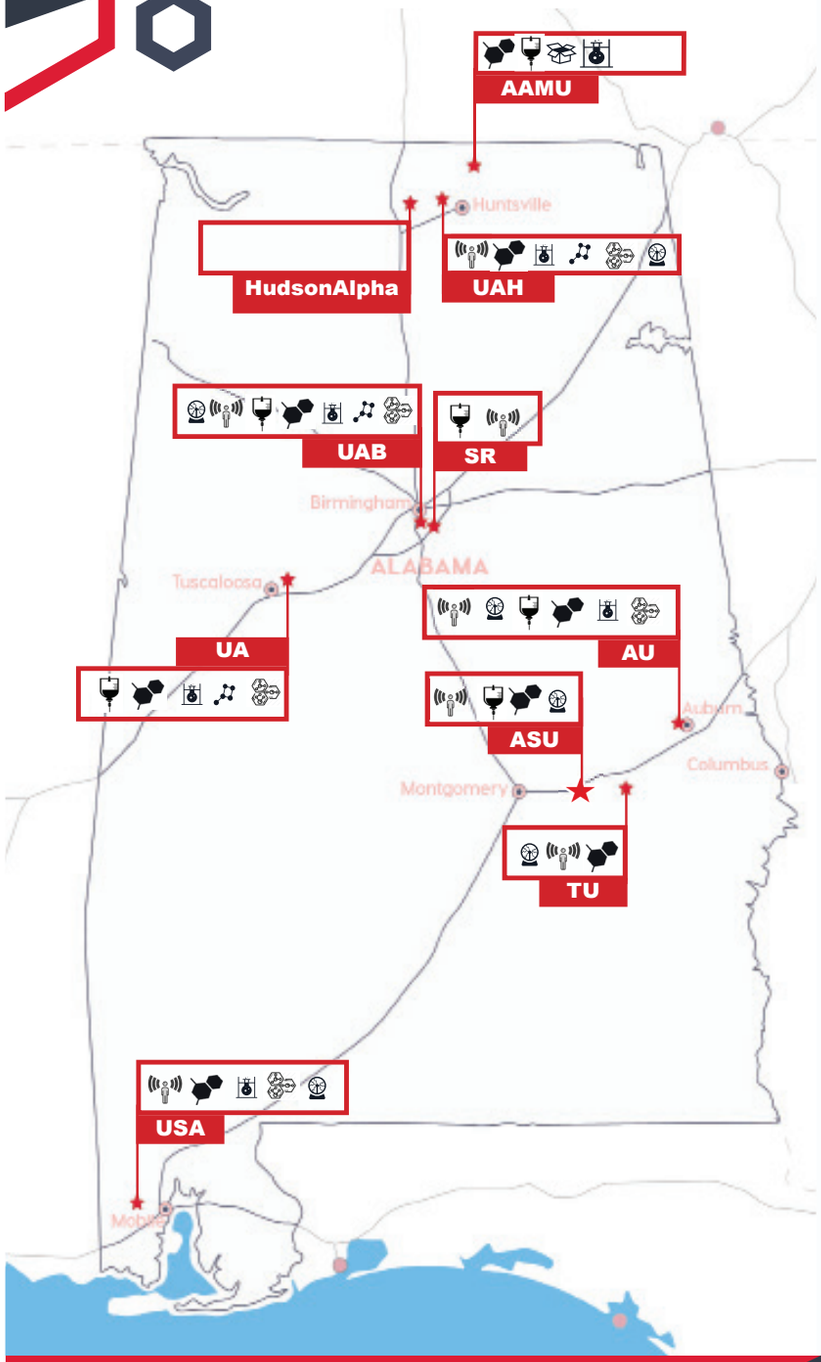
Education/ Human Resources

Applications of Plasma Science

Space Plasma & Plasma Astrophysics

Low Temperature Plasma

Nanotechnology



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TU — Tuskegee University

UA — University of Alabama

UAB — University of Alabama at Birmingham

UAH — University of Alabama in Huntsville

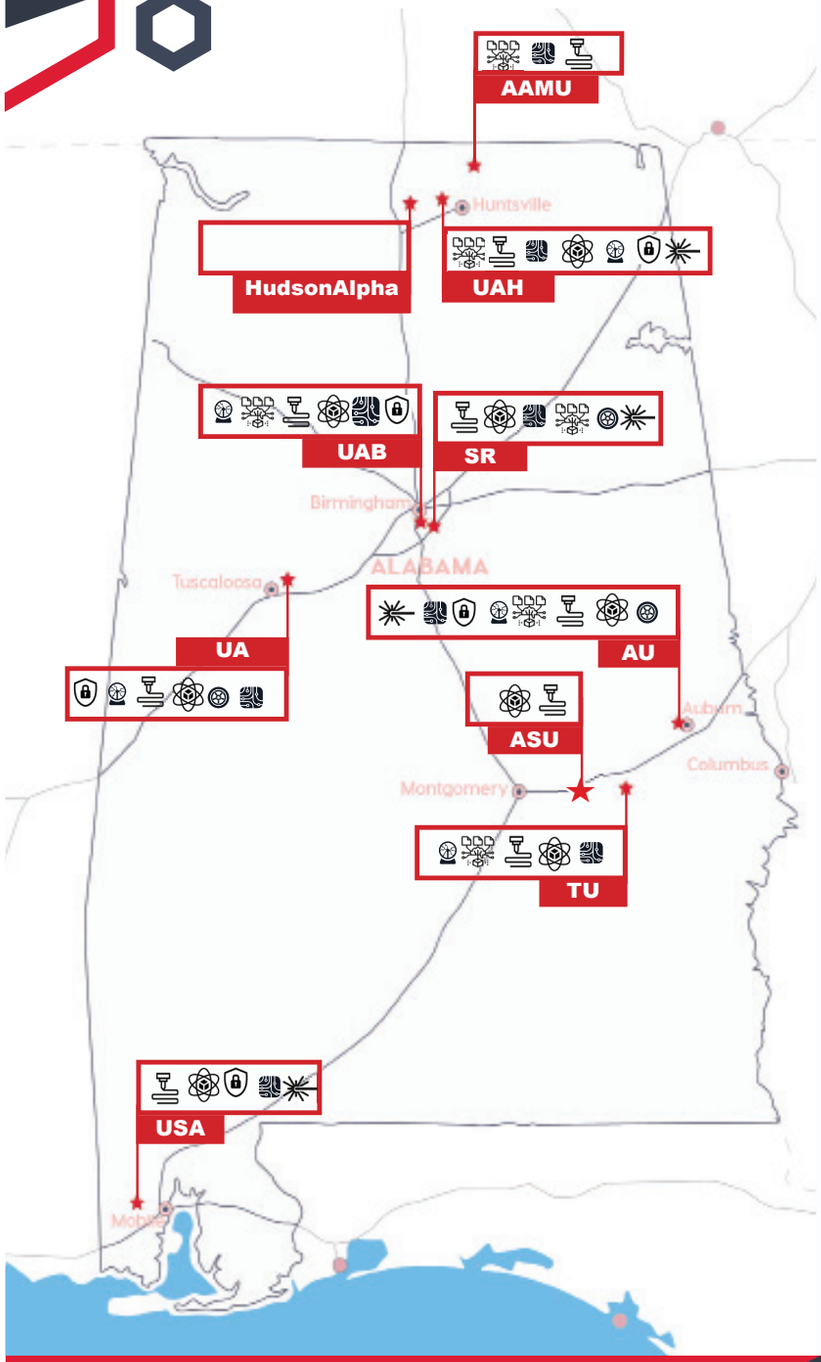
USA — University of South Alabama

SR — Southern Research

ASU — Alabama State University

- Nano Material Composites & Fabrication
- Therapeutics & Drug Delivery
- Food Packaging
- Sensor Technology
- Nanostructures, Particles & Chemistry
- Engineered Nano Effects
- Nanoelectronics
- Low Temperature Plasma

Advanced Manufacturing



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UAH
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USA
University of South Alabama

SR
Southern Research

ASU
Alabama State University

Modeling & Simulation

Additive Manufacturing

Advanced Materials

Security

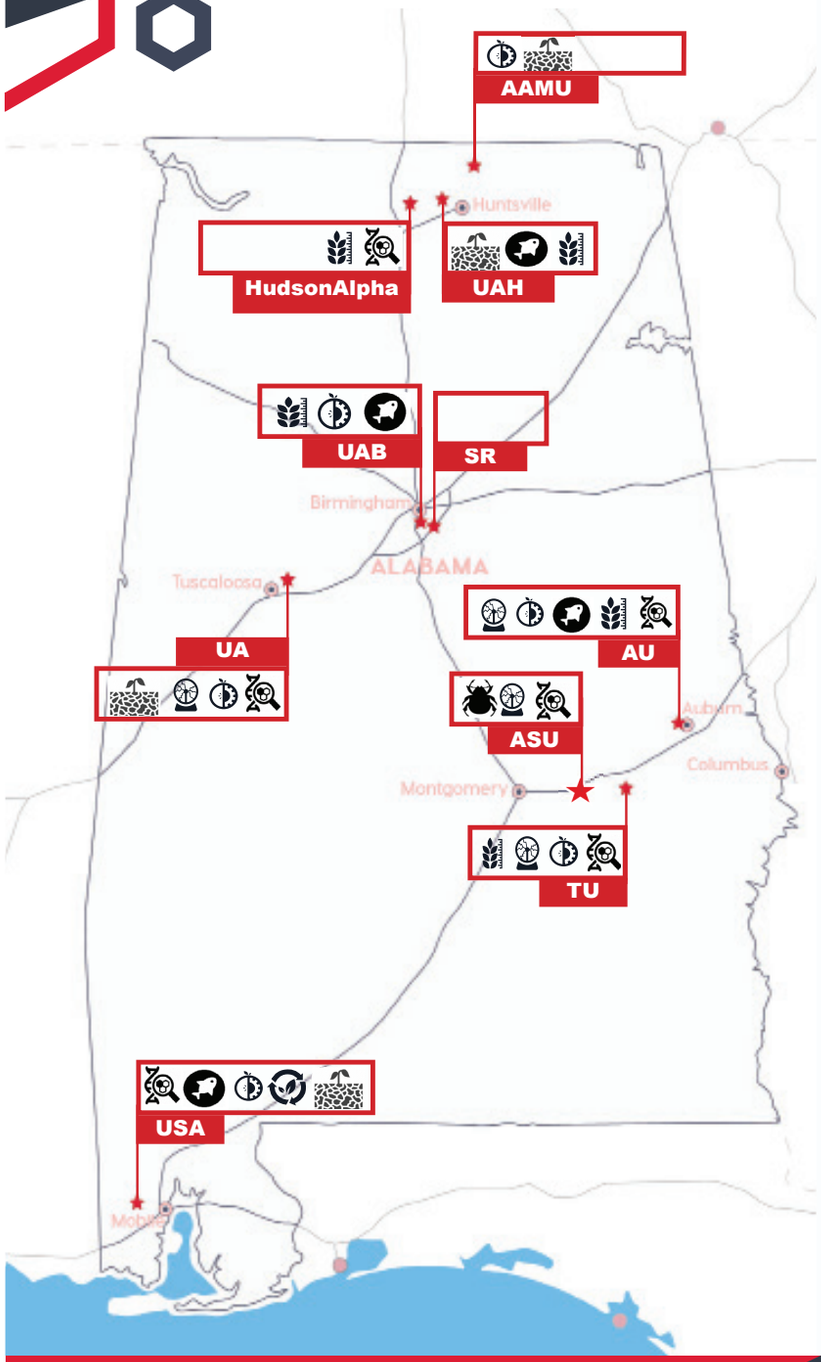
Tribology, Wear & Coatings

Systems Engineering

Low Temperature Plasma

Electromechanical Optical & Infrared

Agricultural/ Food Production



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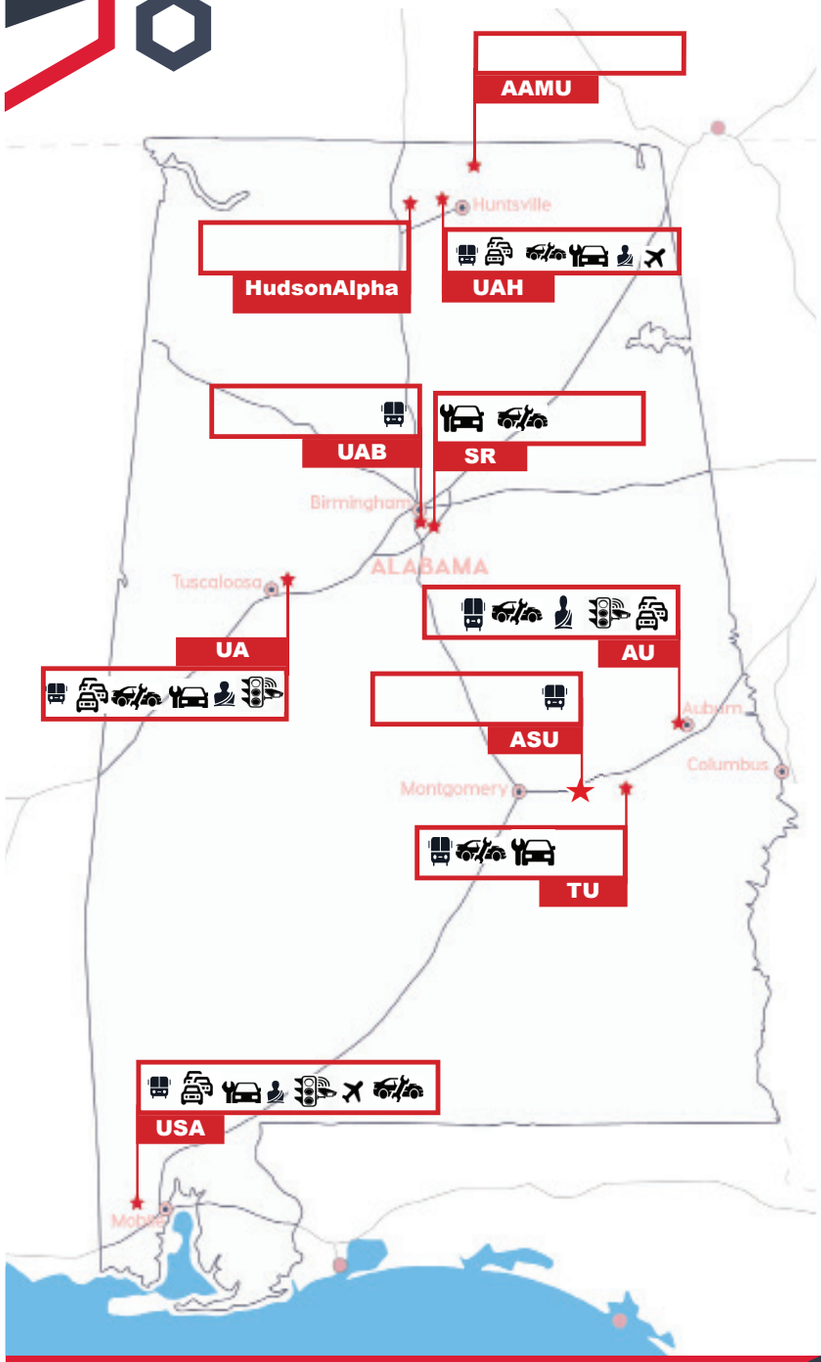
- Genomics & Biotechnology
- Precision Agriculture
- Modeling - Soil, Climate & Water
- Food Processing Nutrition & Packaging
- Fisheries & Aquaculture
- Agricultural Waste Management
- Low Temperature Plasma
- Plant Insect Interactions

Automotive & Aerospace Technologies



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Intelligent Transportation

Traffic Management

Vehicle Development

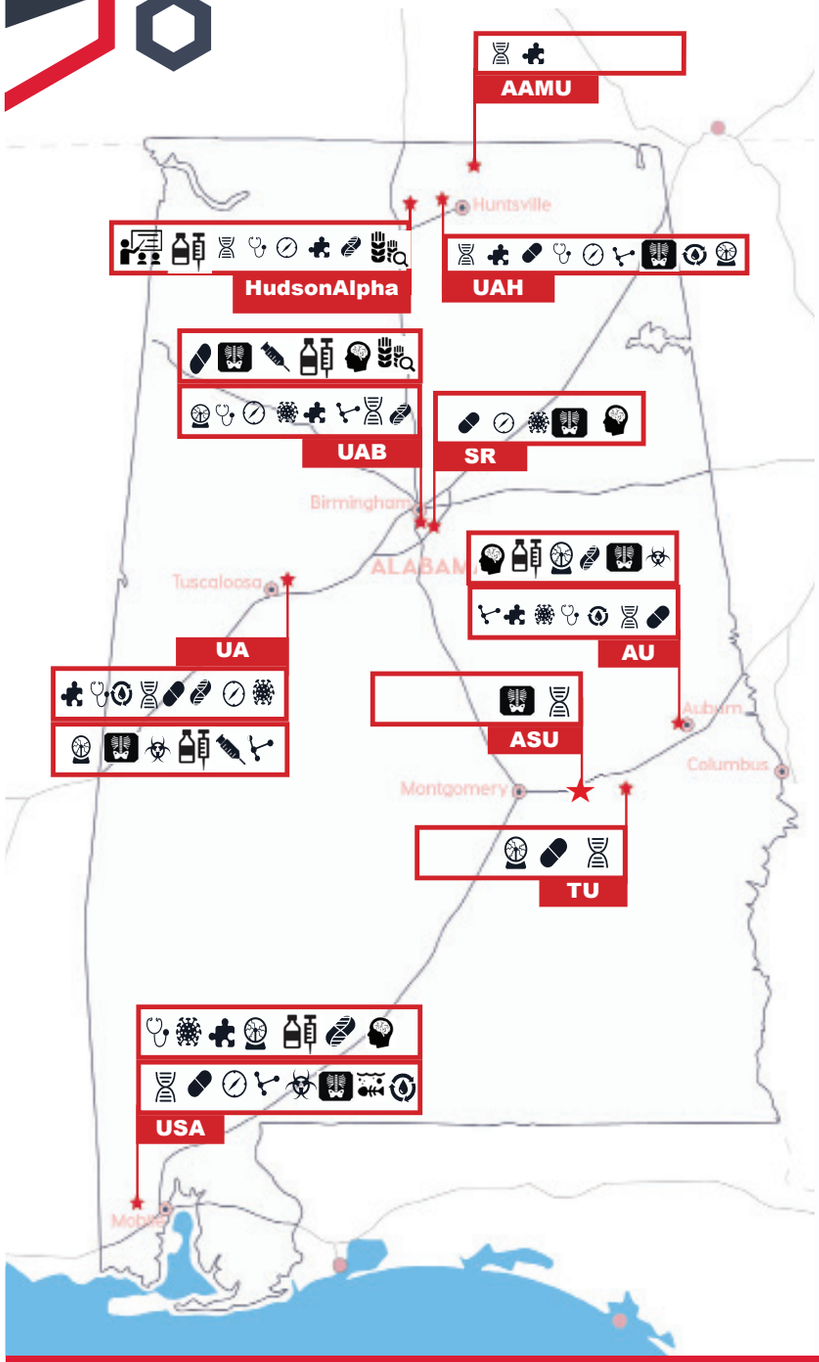
Transportation Related Engineering

Transportation Safety

Road Technology

Aerospace Development

Biosciences/ Biotechnology



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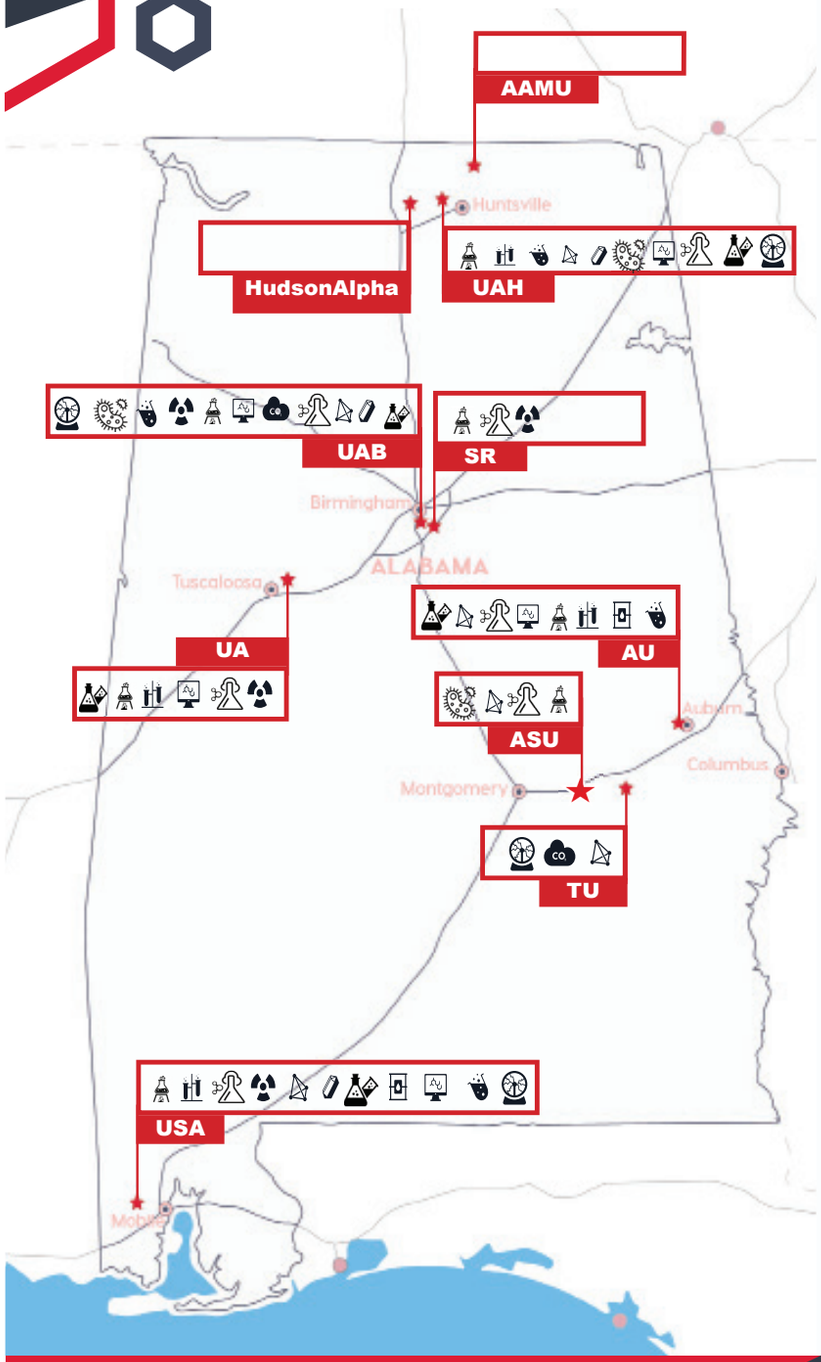
- Biomedical Genomics & Informatics
- Patient Care & Clinical Research
- Pharmaceutical Development
- Biomarker Discovery
- Disease Models
- Systems Biology
- Molecular Medicine
- Remediation & Waste Management
- Biomedical Devices & Materials
- Marine Pharmacology
- Waste Water Treatment
- Protein Chemistry & Engineering
- Precision Medicine
- Plasma
- Agricultural Genomics & Informatics
- Education/ Human Resources
- Neurology
- Restorative Medicine

Chemistry/ Petrochemical



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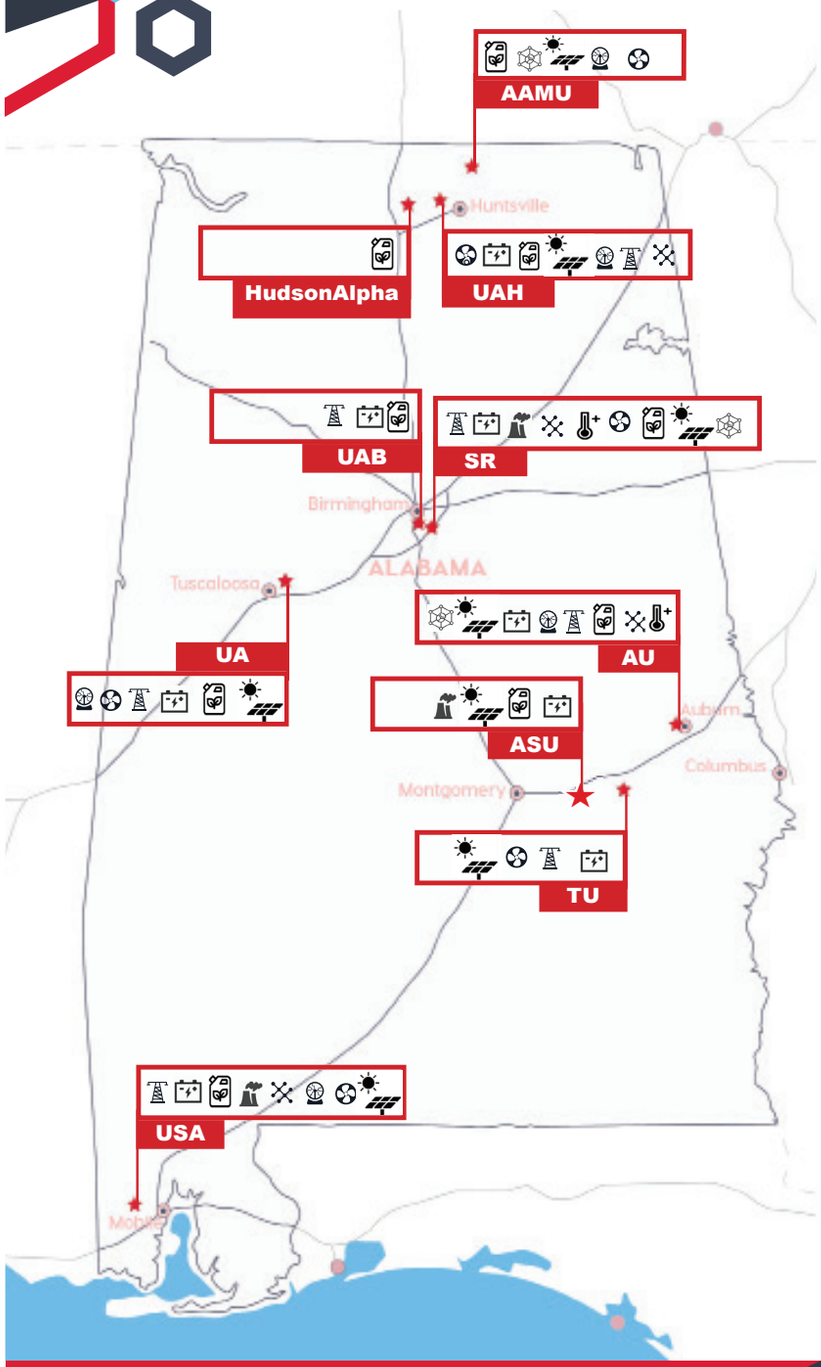
- Analytical Chemistry
- Chemical Engineering
- Petroleum Remediation & Management
- Computational Chemistry
- Carbon Sequestration
- Catalysis
- Environmental Chemistry & Toxicology
- Surface Chemistry
- Polymer & Material Chemistry
- Crystallography
- Biochemistry
- Plasma
- Medical Chemistry

Energy



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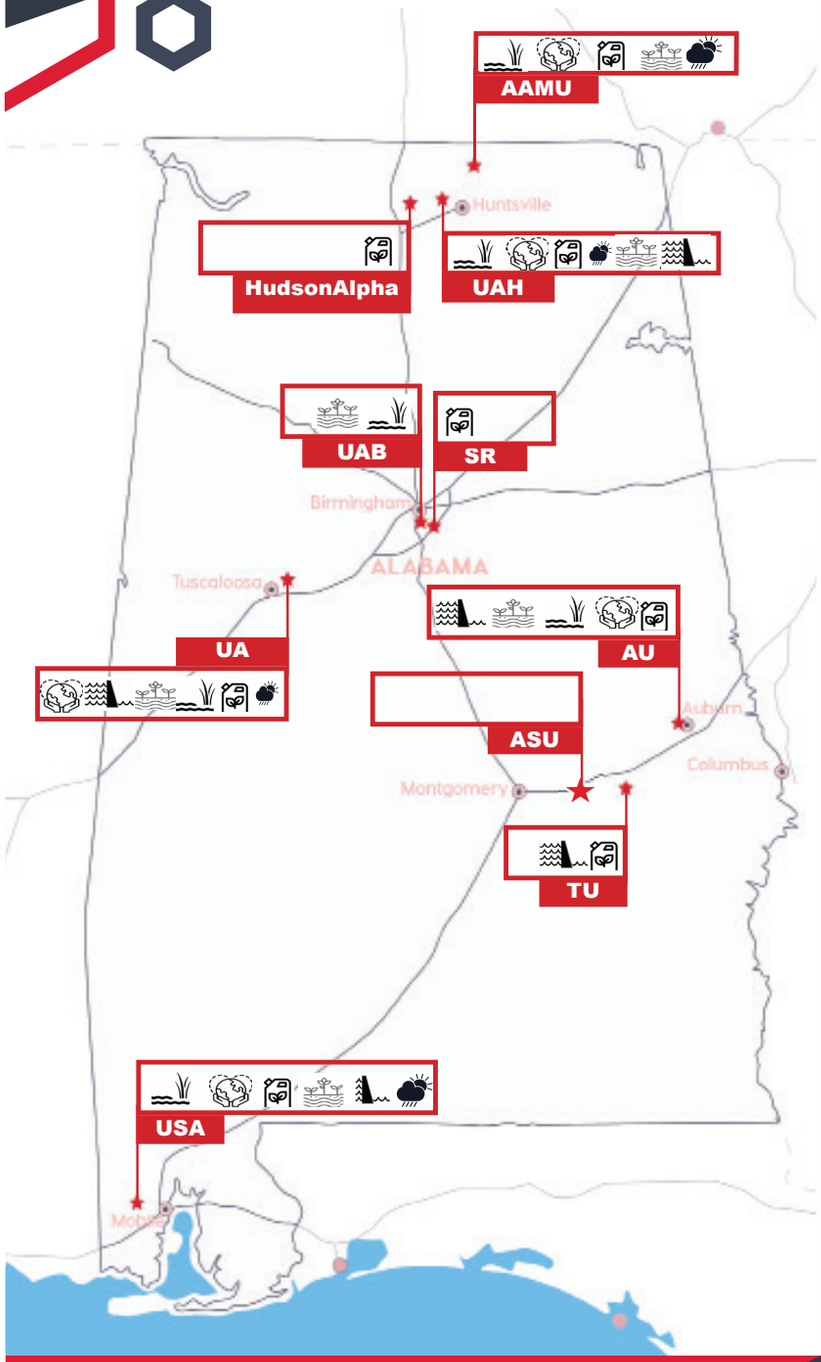
- Propulsion Systems
- Power Grid Technology
- Energy Storage
- Biofuels
- Wind Solar
- Pollution Control
- Hydro-carbon Energy
- Modeling & Engineering
- High Temperature Materials
- Low Temperature-Plasma

Forestry Products/ Natural Resources



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UAB
University of Alabama at Birmingham

UAH
University of Alabama in Huntsville

USA
University of South Alabama

SR
Southern Research

ASU
Alabama State University

Surface Water Resource

Environmental Health & Modeling

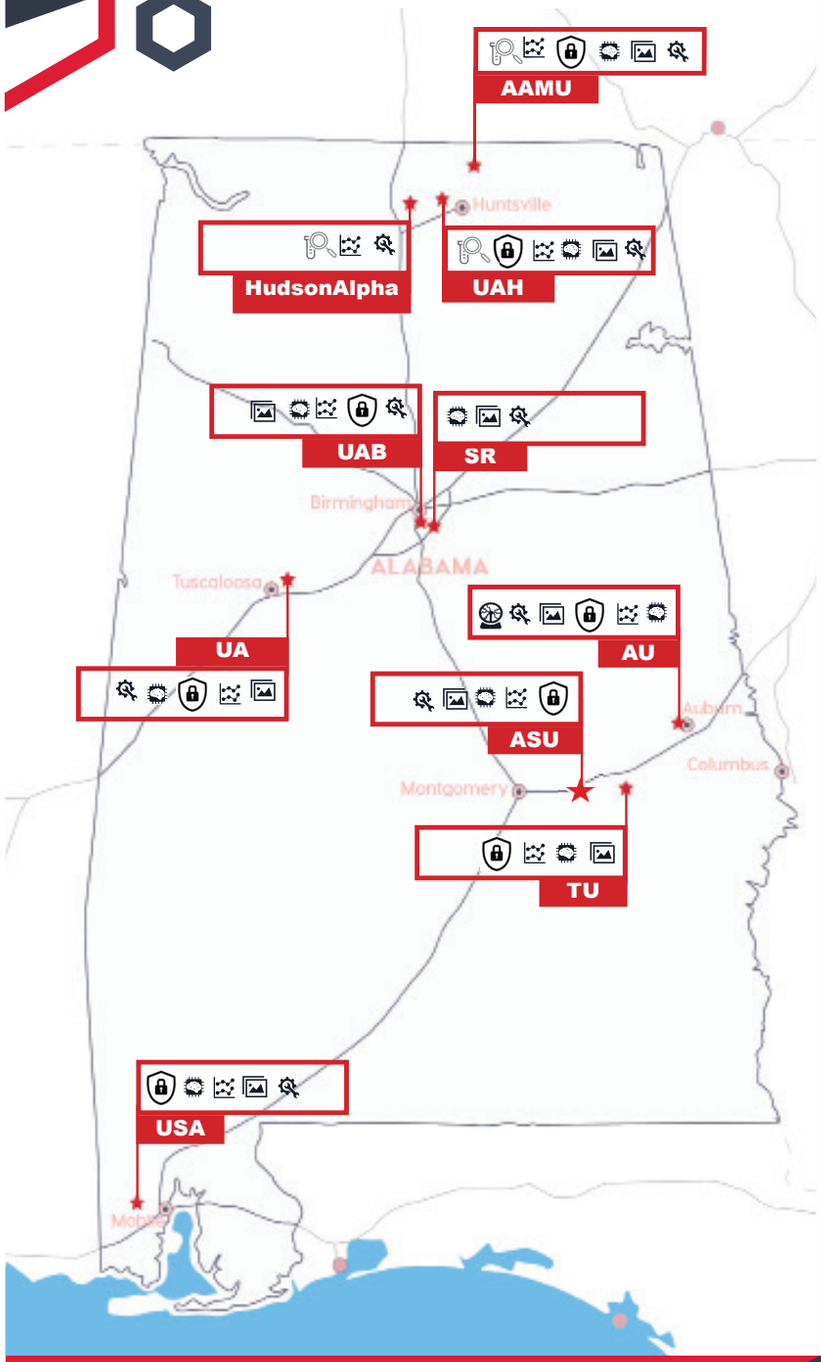
Biofuels & Products

Infrastructure & Technologies for Water Management

Soil & Ground-water Resource

Atmospheric Science

Information Technology & Cybersecurity



HudsonAlpha
HudsonAlpha Institute for Biotechnology

AAMU
Alabama A and M University

AU
Auburn University

TU
Tuskegee University

UA
University of Alabama

UAB
University of Alabama at Birmingham

UAH
University of Alabama in Huntsville

USA
University of South Alabama

SR
Southern Research

ASU
Alabama State University

Bioinformatics

Security

Big Data

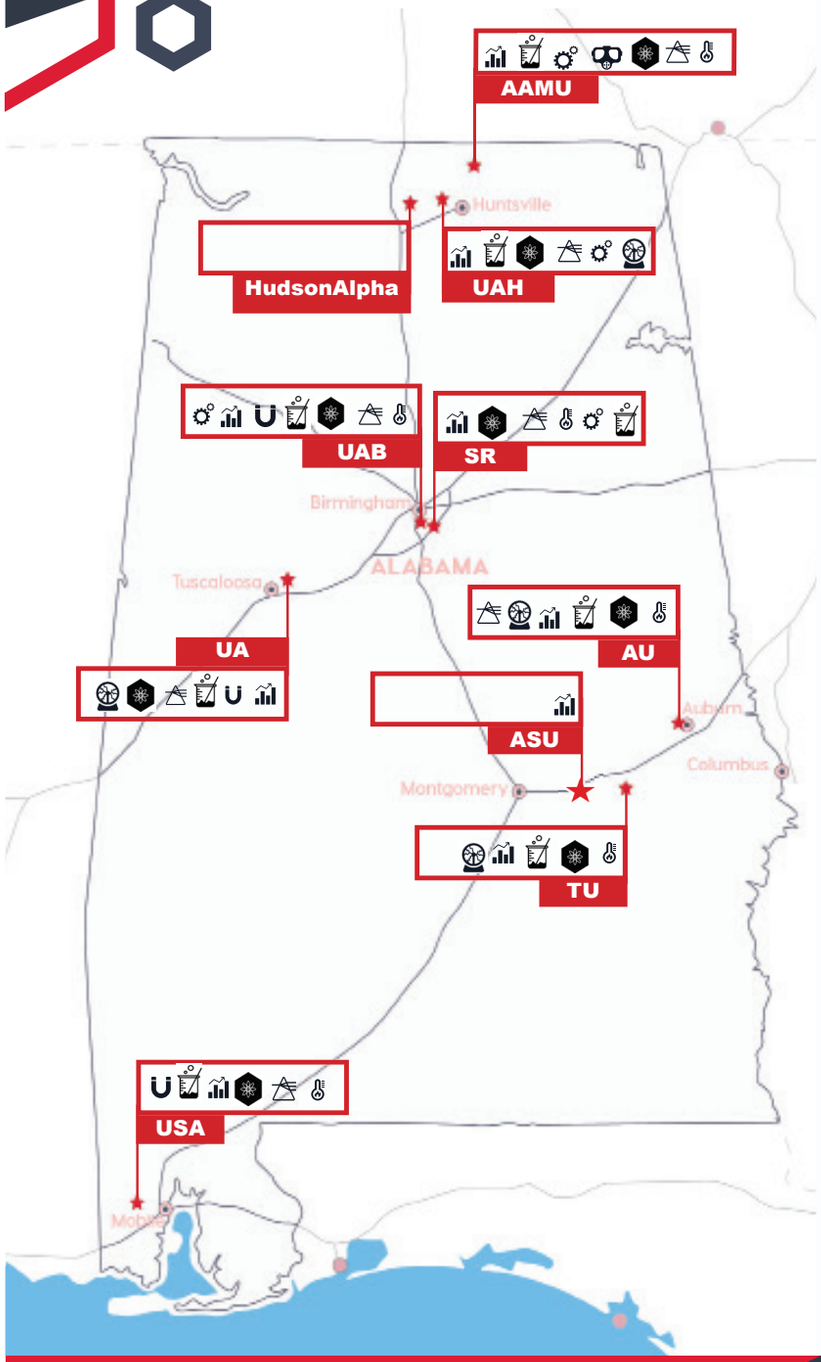
Artificial Intelligence Machine Learning

Modeling & Image Processing

Software Engineering

Low Temperature Plasma

Metal & Advanced Materials



HudsonAlpha — HudsonAlpha Institute for Biotechnology

AAMU — Alabama A and M University

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- Chemical Property Analysis & Testing
- High Magnetic Materials
- Materials Processing & Chemistry
- Smart Materials
- Electronic & Optical Materials
- Extreme Materials
- Materials Treatment
- Nuclear Material Safety
- Low Temperature Plasma

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Acknowledge approval of the Alabama EPSCoR 2021 Research Infrastructure Improvement Science and Technology Plan, July 20, 2021.

Dr. Christopher Brown, Chair
Alabama EPSCoR Steering Committee
Vice President for Research,
University of Alabama at Birmingham

Dr. Robin McGill
Alabama Commission on Higher Education

Shaik Jeelani
Shaik Jeelani (Jul 30, 2021 12:53 CDT)

Dr. Shaik Jeelani, Vice-Chair
Alabama EPSCoR Steering Committee
Vice President for Research and Sponsored Programs
Tuskegee University

Robert Lindquist

Dr. Robert Lindquist
Vice President for Research and Economic Development
University of Alabama in Huntsville

Lynne Chronister
Lynne Chronister (Jul 30, 2021 12:22 CDT)

Ms. Lynne Chronister
Vice President for Research and Economic Development
University of South Alabama

Dr. Daniel Wims
Provost and Vice President for Academic Affairs
Alabama A&M University

James Weyhenmeyer
James Weyhenmeyer (Aug 4, 2021 13:23 CDT)

Dr. James Weyhenmeyer
Vice President for Research and Economic Development
Auburn University

Russell J. Mumper
Russell J. Mumper (Jul 30, 2021 11:12 CDT)

Dr. Russell Mumper
Vice President for Research and Economic Development
The University of Alabama

Christine Thomas
Christine Thomas (Aug 3, 2021 12:02 CDT)

Dr. Christine Thomas
Associate Vice President for Institutional Effectiveness
Alabama State University

Greg Barker
Greg Barker (Aug 2, 2021 11:12 CDT)

Mr. Greg Barker, President
Economic Development Partnership of Alabama