

Alabama Research Target Areas - Capabilities											
Primary Target Areas	Secondary, sub-target areas	Institutions									
		HudsonAlpha	AAMU	ASU	AU	TU	UA	UAB	UAH	USA	SR
Plasma	Experimental Plasma Science		Plasma aerodynamics/Hypersonics		Fundamental Laboratory Plasma Experiments	Material Science / Engineering	Material Science / Engineering	Material Science / Engineering	Gas Discharge	Probe Development	
					Laboratory simulation of space environments	Chemistry	Gas Discharges	Chemistry	Optical plasma diagnostics	Plasma physics	
					Fusion energy research			Gas Discharges	Probe diagnostics	Plasma switches	
					Laboratory and microgravity studies of flowing plasmas				Laser diagnostics	Space weather	
					Probe Development					Pulsed Plasmas	
					Control over fractional ionization in low temperature plasmas					Instruments for space plasma characterisation	
					Dusty plasmas						
					Optical Plasma Diagnostics						
	Fundamental Plasma Physics								Waves & Turbulences		
									Particle Transport and Energization		
									Reconnection		
									Shock Waves		
									Statistical Plasma Physics		
	Engineering		Weakly ionized plasma		Plasma Probe Engineering			Bioscience/ Bioengineering	Propulsion		
			Plasma propulsion		Engineering of Optical Plasma Diagnostic Systems				Aerospace		
			Particle-in-cell (PIC) simulations						Biomedical		
	Theory / Computation / Modeling		Computational plasmadynamics		Space Plasma		Space Plasma	Machine Learning Approaches in Plasma Synthesis	Space Plasma	Space Plasma	
			PIC Simulation modeling of relativistic jets		Atomic Physics		Material Science / Engineering		Basic Plasma Science	Space Weather	
			Computational plasmadynamics		Space Weather		Chemistry		Space Weather		
	Education / Human Resources				Human Development	Human Development		Human Development	Human Development		
	Applications of Plasma Science		Plasmas for Food and Agriculture	LTP for vascular graft development	Nanoparticle Pattern Formation in Magnetized Plasmas	Plasma Induced Nanoparticle and Polymer Synthesis	Plasmas for Surface Chemistry	Microwave Plasma Synthesis and Processing of Superhard Materials	Seed Treatment and Food Processing Applications	Plasma Related Combustion for Micro-Thrusters	
			Plasma as a biocide for treating seed and food-borne diseases	LTP induced cell growth and tissue engineering	Plasma Erosion of Surfaces	Nanoparticle Based Cancer Treatment	Plasma Surface Interactions	Plasma Based Smart Materials	Plasma Induced Chemical Reactions	Plasma Based Nanodevice Fabrication and Diagnostics	
			Plasma induced seed germination and early sprouting in rhizomatous crops.	Antimicrobial scaffold development using LTP for tissue engineering	Atomic and Molecular Processes at Plasma-Surface Interfaces	Plasma Surface Treatment for Nanoparticles and Polymers	Plasma Surface Treatments and Surface Ablation for Advanced Manufacturing	Plasma Surface Deposition for Advanced Manufacturing	Plasma Biology and Medicine	Plasma Based Cancer Treatment	
			Promote plant growth, yield and quality		Using modeling and experiments to understand and predict space weather phenomena	Plasma Surface Treatment for Metals, Alloys, Metal Oxides	Plasma Related Satellite Propulsion and Systems	Plasma synthesis of Quantum Materials	Plasma Surface Treatments for Advanced Materials and Advanced Manufacturing	Plasmas for Small Satellite Propulsion	
			Plasma activated water with soluble nitrogen as a liquid fertilizer		Plasmas for Nano and Microparticle Formation and Control in Manufacturing	Plasma Surface Treatments for Manufacturing			Plasmas for Electric Propulsion	Using modeling and experiments to understand and predict space weather phenomena	
			Plasma application for modulating gene expression in abiotic stress tolerance		Plasma Science for High Speed Imaging and Image Processing				Using modeling and experiments to understand and predict space weather phenomena	Compact plasma switches	
					Plasma and Atomic Science for High Performance Computing				Plasma assisted combustion and ignition for energy and propulsion		
					Energy Related Thermal Properties of Plasmas						
					Development of fusion as a long-term energy solution						
					Plasma as a biocide for sanitizing poultry egg surface						
	Space Plasma and plasma astrophysics		Space plasma						Solar Atmosphere	Space plasma physics & space weather	
			modeling of relativistic jets						Solar Wind	Instruments for space plasma characterisation	
			modeling of black hole using GRPIC						Interstellar Medium	Interaction of solar wind w/ the earth's magnetosphere	
			reconnection in space and astrophysical plasmas						Geospace: Ionosphere and Magnetosphere		
	Low Temperature Plasma Physics								Space Weather		
									Partially Ionized Plasma		
									Gas Discharges		

Nanotechnology		HudsonAlpha	AAMU	ASU	AU	TU	UA	UAB	UAH	USA	SR
	Nano material Composites and Fabrication		Material Processing	Nanomaterials for bacterial pathogens	Nanomaterials	Novel Nano-Composite Development and Application	Nano-phase stability	Nanocomposites	Nano- & Micro fabrication	Engineered Nanoporous Materials	
			Semiconductor film		Nanomedicine	Polymer Nano-Composites and Their Applications				Nanostructure Functionalized Fibers	
										Nanocomposites	
										Nano-medical technology	
	Therapeutics and Drug Delivery		Laser Treatment	Silver and silver CNT composites for infectious diseases	Tissue Engineering		Alabama Life Research Institute	Bionanotechnology			Capabilities for production and testing of drug products (SUN, nano and microparticles)
				Antimicrobial peptides	Metal core nanomaterials (cancer therapeutics)		Convergent Bioscience and Medicine	Nanoparticle-based drug delivery and biomedical imaging			
	Food Packaging		Food Packaging								
	Sensor Technology			Forensic Drug Analysis	Bio Sensing	Sensor technology		Nanotechnology-based sensing	Plasmonic and Liquid Crystal sensing	Sensor Technology	Imaging capabilities
					Micro- and nano-scale sensors and electronics			Nanoenabled biosensors	Microfluidics	Mechanical Force Sensors	
	Nanostructures, particles and chemistry		Nano Silver Particles		Nanofibers		Inorganic nanomaterials	Nanostructures and nanostructured biomaterials	Silicon/Protein interfaces	Inorganic Chemistry	
					Nanomedicine		Nanomaterial formulation and characterization	Nanoparticles		Lanthanide and Actinide Chemistry	
							Magnetic nanomaterials			Nanostructure functionalization (chemical)	
										Nanocomposites	
										Carbon nanotubes and nanofibers	
										Nanoelectronics	
										Nanostructures	
										Fibers functionalized w/nanostructures & quantum dots	
										Advanced materials for PhotoElectroChemical hydrogen production	
										Nanoparticle superlattices	
	Engineered nano effects						Quantum dots	Plasmonics	Plasmonics and Quantum Dots		
	Nanoelectronics				Nanoelectronics		Nanoimprint lithography	Low-power custom-integrated nano electronic systems	Microelectronics and MEMS Packaging	Asynchronous Digital Circuits	
					Micro- and nano-scale sensors and electronics			Carbon based transistors and interconnects for computing hardware	Electrodeposition		
	Low Temperature Plasma			Nanobitechnology	Nanoparticle pattern formation in magnetized plasmas	Nanoparticles and polymer		Smart materials	Device fabrication, Plasma synthesis of nanomaterials	Device Fabrication Processes and Diagnostics	

		HudsonAlpha	AAMU	ASU	AU	TU	UA	UAB	UAH	USA	SR
Advanced Manufacturing	Modeling and Simulation		Modeling and Simulation		Automotive Process, Systems and Data Analysis	Modeling and Adaptive Control of Electromechanical Systems		Extrusion compression molding, injection molding	Modeling and Simulation		Process Modeling
			Radiation aging					Manufacturing process simulation			
	Additive manufacturing		3D printing of functional electronics	3D Scaffolds for infectious disease testing and tissue regeneration	Additive manufacturing, polymeric	3D Printing with Biocompatible Plastics	3-D printing / additive manufacturing	Additive manufacturing of biomedical implants	3-D Printing/Additive Manufacturing	Printable Electronics	Production and characterization of metals, composites, and polymers
			Student formula SAE Racing Car Design and Manufacturing		Additive manufacturing, metals		In-space manufacturing	Additive manufacturing	Supply Chain Manufacturing	Additive manufacturing (metals)	In situ non-destructive monitoring
					Cyber Security for additive manufacturing		Robotics	Manufacturing process optimization and cost minimization	Lean Manufacturing	Additive manufacturing (polymer composites)	Material modeling
							Point-of-Need manufacturing	UAVs for infrastructure safety and monitoring	Additive Manufacturing	Three-dimensional printing	Printed electronics
										Three-dimensional integrated-circuits (3D ICs)	
										Additive manufacturing (polymers)	
										Carbon fiber reinforced polymer (CFRP) composites	
	Advanced Materials			Smart materials for tissue engineering	Nano Materials	polymeric composites, fiber reinforced composites	Composite characterization, development and processing	Lightweight composites for automotive and aerospace	Composites for Aerospace Applications	Concrete Science	Composite fabrication capabilities
					Polymers	High-temperature polymer composites	New electronic and magnetic materials	Long fiber reinforced thermoplastic materials processing	Polymers	Intelligent and Virtual Manufacturing for Composite Materials	Optics and electro-optics manufacturing under 50 and 15 for military applications
					Organic electronics and Microfibrous materials		Universal Nanocrystalline Alloys	Electrospinning		Green Manufacturing	
								Induction melting efficiency		Cellulose Nanofiber Extraction	
								Highway safety (roadside barriers)		Advanced manufacturing	
										Carbon fiber reinforced polymer (CFRP)	
										Bio-composites	
	Low Temperature Plasma				Nano- and microparticle formation and control	Surface treatment	Surface treatment, Surface ablation	Deposition	surface treatment		
	Security				Cyber Security for additive manufacturing		Alabama Cyber Institute	Cyber security for critical infrastructure interdependency and cascading	Cybersecurity	Supply-Chain Security	
								Cyber security of Manufacturing Databases	Trusted Supply Chains	Cybersecure Electronics Manufacturing	
										Artificial Intelligence (AI)	
										Hardware-enabled privacy	
	Tribology, wear and coatings				Tribology		Tribology, wear and coatings	Coating Technologies			Full testing capabilities
	Systems Engineering		Logistics		Model-based systems engineering	Micro-fabrication and Rapid Prototyping with Multi-Materials	Joining technology	Spacecraft thermal systems	Industrial Control Systems	Steel Structural Engineering	Full testing capabilities
							Electromechanical systems	Engineering Lighter Weight Composite Based Heavy Truck Components	Systems Engineering	Systems simulation, modeling, & analysis	Full systems engineering and fabrication
							Embedded systems	Systems Engineering of Composite Based Auto parts	Advanced Robotics	Application of AI	
							Manufacturing metrology	Development of light weight composite armor for the Army and Navy		Database design & development	
										Design & analysis of production systems	
	Electromechanical, Optical and Infrared				Laser-based optical diagnostic methods				Advanced Solid Optic Manufacturing	Compound semiconductors	pois, turrets, and stabilized gmbal systems

Agricultural Products/ Food Production

	HudsonAlpha	AAMU	ASU	AU	TU	UA	UAB	UAH	USA	SR
Genomics and Biotechnology	Plant Genomics/ Genetics		Plant molecular biology, Biotechnology	Agricultural Biotechnology	Plant Genetics	Alabama Life Research Institute			Hops Research	
	Plant Genome Sequencing		PCR, DNA analysis	Vaccine design/molecular therapeutics (applicable to bovine & avian systems)		Molecular Genetics/ Biology			Computational Genomics	
	De novo assembly of complex plant genomes		Plant and insect Genomics							
	Plant Evolution and Comparative Genomics									
Precision Agriculture	Molecular Crop Phenotyping			Precision Ag	Microirrigation and Enhanced Water Use Efficiency		Urban Greenroof	multispectral remote sensing		
	Molecular Crop Breeding			Disease / Pest Management			Food Production			
	Genomics and modification of perennial crops									
	Genomics for Crop Improvement									
Modeling - Soil, Climate and Water		Soil/Climate Modeling				Alabama Water Institute		Atmospheric Science	Atmospheric Science	
						Center for Complex Hydrosystems Research		water resource management	Marine Geochemistry	
						Remote Sensing Center				
Food Processing Nutrition and Packaging		Food Processing/Engineering/ Packaging		Food Chemistry and Safety	Enhanced Novel Food Products	Food Production	Food production		Vitamin & Supplements and Nutrition	
		Nutritional Biochemistry		Food defense	Sustainable Organic Plant and Animal Production	Nutrient flow sensing	Nutrient flow sensing		Anti-Microbial Films	
		Food Chemistry and Safety					Sustainable Animal Feed			
							Alternative Dietary Protein			
Fisheries and Aquaculture				Aquaponics and water science			Urban Aquaculture	Integrative evolutionary ecology	Aquaculture	
							Sustainable Water Usage		Fisheries	
									Marine Ecosystems and Health	
									Water/Wastewater Treatment	
Agricultural Waste Management									Agricultural Waste Management	
									Bioregry and Biofuels, Water/Wastewater Treatment; Solid Waste Mgt.	
Low Temperature Plasma			Odorometry analysis	Application of atmospheric pressure plasmas for food safety	Nanoparticle treatment for polymer filler compatibility	Surface Chemistry				
Plant Insect Interactions			Integrated Pest Management, Green House studies							
			Conventional Pesticide and Biopesticide Evaluations							
			Insect Sampling, Surveys and Taxonomy							

Automotive & Aerospace Technologies

HudsonAlpha	AAU	ASU	AU	TU	UA	UAB	UAH	USA	SR
Intelligent transportation		DOT Personal Training	Testing of electronic components for harsh environment, CAVE3, Center for Advanced Vehicle Electronics for Extreme Environments	Intelligent transportation	One of the Top Five Test Bed Facilities in the Nation	Vehicle dynamics and controls	Traffic Engineering	Route Optimization	
			Autonomous vehicle development, guidance and control and GPS systems	Vehicle sensing and re-identification applications	Test Bed of 85 Radio-Instrumented Traffic Signals	Wireless sensor and bridge weigh in motion (BWM) system for next generation infrastructure safety	Geographic Information Systems	Intelligent transportation systems (ITS)	
				Automatic road sign detection for smart vehicle	Connected Vehicles and Infrastructure	Sustainable Smart Cities Research Center	Simulation	Transportation systems	
					Sustainable Transportation Infrastructure			AI in transportation, geometric design, & optimization	
					Infrastructure-to-Vehicle Communication Test Bed Research			Intelligent transportation systems (ITS)	
								Artificial Intelligence	
Traffic Management			Traffic Engineering		Test Bed is a Prototype for Alabama's DOT State-Wide Signal System		Public Transport	Highways and intersections	
					Digital Transportation		Urban Planning	Roundabouts (traffic)	
							Management Systems	Highways	
								Traffic circles	
								Traffic congestion and control	
								Traffic operation	
								Intermodal Transportation Systems	
								Hurricane Evacuation	
Vehicle development			Use of the NCAT test track for testing of vehicle and fuel systems	Electric battery impedance measurement facility	Heavy Equipment Engine Efficiency Combustion				Fuels testing
			Hybrid propulsion system for automobile using combination of electric and internal combustion and fuel cell.		Center for Advanced Vehicle Technologies				
					Electric Vehicles and Fuel Economy				
					Target Zero-Accident Enabled Technologies				
					Driver-Less Vehicles				
					Vehicle Antennas for a Connected Vehicle Environment				
Aircraft development							Spacecraft propulsion systems	Air Taxis	
							Unmanned Aircraft Systems		
							Rotorcraft		
Transportation Related Engineering			Highway structures	Materials engineering for transportation sector: automotive, aerospace, defense and marine	Timely and Less Costly Roadway Pavement Rehabilitation Techniques		Transportation Engineering	Coastal Engineering	Composites testing
							General Civil Engineering	Planning (transportation systems)	"Behind the meter" energy storage utilizing previously used EV batteries
								Transportation & Infrastructure systems & planning	
								Application of econometric & statistical methods	
Transportation Safety			Construction site work zone safety, wrong way driving solutions		Repository and Study Center for Data for Crashes, Roadway Characteristics, Traffic, Driver Credentials, Emergency Response and Patient Treatment		Software Safety Critical Systems Cybersecurity	Transportation Safety	
					Transportation Safety, Security, and Accessibility			Fatigued driving	
								Resiliency (transportation systems)	
								Highway safety	
								Driver behavior studies	
								Roadway departure accidents	
								Safety in transportation systems	
Road Technology			Asphalt pavement research		Concrete Pavement Friction and Texture			Bridge Maintenance	
			Highway structures		Reinforced Structural Composites			Infrastructure Resilience	
			Intelligent transportation systems		Design Prestressed Girders			Bridge Widen Load	
								Highway Runoff Treatment and Management	
								Pile Foundation Setup (geotechnical)	
								Asphalt pavements	
								Recycled materials (pavements)	
								Sustainable pavements	
								Design & Operation of Roundabouts	
								Advanced traffic operations & congestion management	
								Smart, Resilient, & green pavement materials characterization & design	
								Advanced laboratory characterization for asphalt binders & mixtures	
								Warm mix asphalt	
								Pavement modelling	

	HudsonAlpha	AMMII	ASU	AU	TU	UA	UAB	UAH	USA	SR
Biomedical Genomics and Informatics	Medical Genomics	Nutrigenomics	Dynamic behavior of various prey-predator models with delay	Omics / Informatics	Gene discovery	Alabama Life Research Institute	Bio-informatics	Genomics/Transcriptomics	Microbial Metagenomics	
	Bioinformatics and Data Analysis		silver and gold nanomaterials for infectious diseases	Molecular Medicine		Alabama Water Institute	Genomics	Genetics	Population Genetic Analysis	
	Genomics			Genomics			Single Cell Genomics		Immunotoxicology	
	Immunogenomics			Pharmacogenomics			Computational Biology		Plant Genomics	
	Structure, function, and evolution of human genomes			Retrospective, population-scale analyses of drug efficacy, drug safety, and public health					Functional Genomics	
	Genomics of Neurodegenerative Diseases			Microbiomics					Computational Analytics	
				Biophysics					microRNA Technologies	
				Single cell transcriptomics					Novel Reagents to Assess DNA Damage and Repair	
									Silver Nanoparticles in Skin Cancer Prevention	
									DNA mechanics	
Pharmaceutical Development				Pharmaceutical Engineering	Drug Delivery	Drug Delivery	Nanoscale materials and biointegration	Protein Structure and Characterization	Drug Discovery	Compound libraries for screening
				Drug Discovery / Drug Delivery	Nano-biomedicine	Nanomaterial based diagnostic systems	Biomaterials	Computational Drug Discover	MO Cancer Therapeutics	HTS (High throughput screening) capabilities
				Drug target identification/validation		Alabama Life Research Institute	NMR Characterization at Central AL High-field NMR Facility	Antimicrobial Development	Local drug delivery systems	Medicinal/organic chemical synthesis and combinatorial design
				Drug metabolism and disposition		Biomedical engineering	Medicinal chemistry			Assay development and validation for clinical trial capabilities
				Candidate molecule optimization (medicinal chemistry)		Convergent Bioscience and Medicine	Drug Trials - O'Neal Comprehensive Cancer Cnt (CCC)			FDA regulated preclinical capabilities
							Alabama Drug Discovery Alliance (UAB & SR)			Infectious disease screening for new drugs and vaccines including biothreat
Precision Medicine	Genome sequencing, genotyping, and analysis			Drug Delivery		Institute for Rural Health Research	Precision Diagnostics		Metabolomics	
	Pharmacogenomics			Additive manufacturing, for custom implants			Genomics		Gene Therapy	
							Personalized Therapeutics		Disease Endotyping	
							Drug Development		Proteomics	
							Precision Oncology			
							Pharmacogenomics			
Patient care and clinical research	Personalized Medicine			Pharmaceutical care outcomes research		Alabama Life Research Institute	Arthritis and autoimmunity diagnosis and treatment	Diabetes and Insulin Resistance	MO Clinical Trials - Phase I, II, III, IV	
	Clinical Genomic Medicine			Retrospective, population-scale analyses of drug efficacy, drug safety, and public health		Opioid abuse and drug interventions	Diabetes and obesity research, nutrition, and clinical care	Drug Delivery	Microbiota and Cancer Therapy	
	Polygenic Risk Scores			Interventional clinical trials		Institute for Rural Health Research	Disability Health and Rehabilitation Science		Biomedical imaging	
	Genetic Diagnosis of Rare Diseases			Drug metabolism and disposition		Center for the Prevention of Youth Behavior Problems	Basic and clinical studies of aging		Cell culture	
	Delivery of genetic test results			Biofluid mechanics		Rural Health and Health Disparities	pulmonary diseases		Clinical imaging	
				Exercise interventions (e.g. hypertension, vascular inflammation, blood pressure)		Implementation Science	Health Disparities research		Medical imaging	
						MRI Center	Patient outcomes and comparative effectiveness		Magnetic resonance imaging (MRI)	
							Exercise biology and medicine		CMR (cardiovascular magnetic resonance imaging)	
							Infectious diseases		Cardiovascular devices, mechanics, pathology	
							Visual and oral systems		Echocardiography	
							Cancer care - O'Neal Comprehensive Care Cnt		Endoscopy	
							Neurological Diseases		Fluorescence imaging	
							Transplant Medicine		Heart Failure Detection	
							Genetic Counseling		Heart failure	
							Rare Disease Precision Medicine		Human thermoregulation	
							Quantitative Imaging		Hyperspectral imaging	
									Viral Genome Sequencing	
									Anti-Viral Therapeutics	
									Clinical Pulmonary Hypertension Research	
									Trauma and critical care surgery	
									Diseases of the Esophagus	
									Underserved populations	
									Healthcare Disparities	
									Sepsis	
									Long-term care research	
									Burn Research	
									Epilepsy Research	
									Amyloidosis	
									HW Research	
									Local drug delivery systems	
									Magnetic resonance imaging (MRI)	
									Tissue engineering	

	HudsonAlpha	AMRI	ASU	AU	TU	UA	UAB	UAH	USA	SR
Biomarker Discovery	Cancer Diagnosis and Prognosis					Bio-scaffolds	Biomarker ID for Human Disease	Bioinformatics	Biomarkers for the Detection of Cancer	biomarker assay development and validation
	Drug Response and Pharmacogenomics					Alabama Life Research Institute	Precision Medicine Institute	Genome Transcription Factors	Hyperspectral Imaging	
	Cell free DNA Analysis								Metabolomics	
									Non-coding RNAs	
Disease Models									Tissue Engineering	
				In vivo model systems of disease and drug action		Tumor models/ cancer progression and therapy mechanisms	Neurological Diseases		Cancer and Health Disparities	Relevant models in cancer, CNS, infectious disease
				In vivo imaging		Alzheimer's and Parkinson's Disease	Autoimmunity		Microbiota and Cancer	Immunology models
				Virology		Autism	Diabetes		Biomolecular modeling and simulation	
						Amniotic Lateral Sclerosis (ALS)	Cancer		Cardiac strain	
						Cystic Fibrosis	Aging		Cell signaling modeling	
						Human Neuroscience	Cystic Fibrosis		Collective cell migration	
							Cardiovascular Disease		Heart failure	
							Sickle Cell		Human thermoregulation	
							Bone Disease		Radiation (biological effects)	
							Obesity		Biomechanics & Mitochondrial Biology	
							HIV/AIDS		Vector-borne Diseases	
							Pulmonary Diseases			
							Hypertension			
							Kidney Disease			
Protein Chemistry and Engineering				Computational protein design and engineering		Protein chemistry and enzymology	Synthetic vaccines	Protein Function	Traditional and Novel Adsorbents	
						Metallochemistry		X-ray and Neutron Crystallography		
Remediation and Waste Management				Protein modeling, design and control		Alabama Water Institute			Biological Waste Management	
									Drinking water, wastewater, & storm water treatment	
									Constructed wetlands for wastewater & storm water treatment	
									Onsite & Small-Community Wastewater technologies & management	
									Decentralized wastewater technologies & concepts	
									Micro-pollutants in wastewater	
									Low-impact development practices	
									Microbial Remediation	
									Water/Wastewater Treatment	
Biomedical Devices and Materials				Forensic Drug Analysis	Bio-sensors and Recognition	Bio-tissue mechanics	Device development for patient rehab	Wireless Biomedical Devices	Hyperspectral Imaging	Medical device engineering
					Biomedical Device Technology	Bio-robotics and prosthetics	Biosensors	Theranostic Nanostructures	Biomedical Devices	
					Biomechanics	Alabama Life Research Institute	Ultra-hard Coatings for artificial joints		Hyperspectral imaging	
					Additive manufacturing for orthotics, implants		New Dental Implant Materials		Bio-composites	
					Optical imaging (ALIMS)		Cardiac Implants		Bio-electromagnetics	
					MRBC (1/7T functional MRI)		Orthopedic Implants		Nano-medical technology	
							Cyclotron Facility Novel Radio Imaging & Therapeutics		Antennas & sensors for biomedical devices	
							Ophthalmology Implants		Novel biomedical & clinical imaging & detection methods	
Marine Pharmacology									Non-Invasive Blood Flow Measurement	
									Marine Pharmacology	
Molecular Medicine	Broad Genomics and Genetics in Clinical and Research Approaches			Molecular therapeutic platform design (AAV/linear phage-based)		Alabama Life Research Institute	Novel microbiological approaches		Metabolomics	
							Immuno-PET imaging		Non Coding RNAs	
									Computational Analytics	
									Biomechanics & Mitochondrial Biology	
									Intercellular Regulatory Pathways	
Waste water treatment				Waste water treatment		Center for Water Quality Research		Waste Water Treatment	Waste Water Treatment	
				Waste water treatment/ concrete wash water alkalinity					Drinking water, wastewater, & storm water treatment	
									Constructed wetlands for wastewater & storm water treatment	
									Onsite & Small-Community Wastewater technologies & management	
									Decentralized wastewater technologies & concepts	
									Micro-pollutants in wastewater	
									Low-impact development practices	

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Chemical / Petrochemical	Petroleum remediation and management				Oil Spill Management					Bioremediation, Water/Wastewater Treatment	
					Petroleum Chemistry						
	Computational chemistry				Computational protein design and engineering		Computational chemistry	Computational chemistry	Protein Docking	Monte Carlo methods	
										Predicting thermodynamic & transport properties of ionic Liquids	
										Self-Assembly of nanoparticle superlattices	
										Binary adsorption in metal-organic frameworks	
										Yield stress determination	
										Molecular simulation of biomass dissolution	
										Noninvasive imaging of paste extrusion	
										Molecular dynamics and simulations	
	Carbon Sequestration				CO2 utilization	CO2 capture and storage, adsorption, membrane separation		CO2 sequestration		Ionic Liquids	Work with the National Carbon Capture Center and Alabama Power (Wilsonville)
	Catalysis			Artificial Photosynthesis	Heterogeneous catalysis		Heterogeneous catalysis	Catalysts and sensors	Solar Fuel Catalysts	Sensors	Design and analysis of catalysts
					C1 catalysis				Heterogeneous Catalysts	Synthesis of efficient oxide-supported noble metal catalysts using supercritical fluid deposition	
										Novel quaternary ammonium salts	
										Supercritical Fluids	
										Phase-Transfer Catalysis	
										Noble metal catalysts	
										Phase-transfer catalysis	
										Activated carbons	
										Supercritical Fluids	
										Zeolites	
										Mesoporous materials	
										Microporous materials	
										Ionic Liquids	
										Physical activation and adsorption	
	Environmental Chemistry and Toxicology						Ionic Liquids	Biochemical and Molecular Toxicology		Environmental Chemistry and Toxicology	Remediation of petroleum contaminated soils
										Ionic Liquids	
										Volatile organic compound (VOC) emissions	
	Surface Chemistry				Surface Chemistry			Raman Spectroscopy Studies of Bioactive Materials	Surface Chemistry	Surface Chemistry	
										Adsorption	
										Multicomponent adsorption	
	Polymer and Material Chemistry			Polymer coated metal nanoparticles and nanotubes	Polymer material science	Polymer chemistry- Nanoparticle catalysis, cellulose deconstruction, small molecule synthesis and characterization, plant derived extracts, bioactive compound synthesis		Polymer chemistry, materials chemistry	Polymers	Materials Chemistry	
								Polymeric Materials for Water Purification		Additive Manufacturing (Polymers)	
								polymer coatings		Ionic Liquids	
								Bionanotechnology			
	Crystallography							Small Molecule Crystallography	Crystal Growth	Crystallography	
								Protein Crystallography for Drug Design			
	Biochemistry			Photosynthesis				Nanotechnology for Biomedical sensing	Biochemistry		
	Medical Chemistry				Computational protein design and engineering		Alabama Life Research Institute	Drug Design and Development	Natural Products	Novel Chemical Development of Cancer treatment, diagnosis and analysis	
								Medicinal chemistry			
	Low Temperature Plasma					plasma induced nanoparticles synthesis		Microwave Plasma Synthesis and Processing of superhard Materials	Plasma induced chemical reactions	Combustion For Micro-Thrusters	
										Characterization of plasma in space	

Chemical / Petrochemical

	HudsonAlpha	AAMU	ASU	AU	TU	UA	UAB	UAH	USA	SR
Analytical Chemistry			Forensic Drug Analysis	Small Molecule Synthesis		Organic/inorganic synthesis	Chemical Synthesis	Analytical	Analytical Chemistry	Carbon fuels and other chemical analysis
				In situ/operando spectroscopy		Chemical analysis	Inorganic Chemistry		Natural Chemical Synthesis	
						Central Analytical Facility	Chemical Analysis		Environmentally Benign Solvent Systems	
						Alabama Analytical Research Center			Absorbent Materials	
									Solution chemistry & molecular thermodynamics	
									Ionic Liquids & supercritical fluids	
									Novel quaternary ammonium salts	
									Effects of molecular scale environment on reactive chemical systems	
									Lipidic ionic Liquids	
									Behavior of reactive chemical systems	
									Supercritical Fluids as solvents	
									Synthesis of efficient oxide-supported noble metal catalysts using supercritical fluid deposition	
									Synthesis methods for components of metal-organic frameworks	
									Metal-organic frameworks	
Chemical Engineering				Chemical Engineering		Functionalized membranes for separations and reactors		Transport Processes	Process Control and Automation	
						Electronic Materials and Devices			Molecular thermodynamics	
						Computational catalysis			Microcontinuum fluid mechanics	
									Reactive chemical systems	
									Fibers functionalized w/ nanostructures & quantum dots	
									Computer-aided process design	
									Supercritical fluid processing	
									Piston-driven/oscillatory mixing	
									Multicomponent adsorption	
									Supercritical Fluids as solvents	
									Synthesis methods for components of metal-organic frameworks	
									Predicting thermodynamic & transport properties of ionic Liquids	
									Molecular simulation of biomass dissolution	
									Binary adsorption in metal-organic frameworks	
									Yield stress determination	
									Noninvasive imaging of paste extrusion	
									Effects of molecular scale environment on reactive chemical systems	
									Behavior of reactive chemical systems	
									Synthesis of efficient oxide-supported noble metal catalysts using supercritical fluid deposition	
									Novel quaternary ammonium salts	
									Ionic Liquids & supercritical fluids	
									Lipidic ionic Liquids	
									Solution chemistry	
									Separation of nonpolar species	
									Solid-liquid mass transfer	

		HudsonAlpha	ASMIU	ASU	AU	TU	UA	UAB	UAH	USA	SR
Chemical / Petrochemical	Petroleum remediation and management				Oil Spill Management					Bioremediation, Water/Wastewater Treatment	
	Computational chemistry				Petroleum Chemistry		Computational chemistry	Computational chemistry	Protein Docking	Monte Carlo methods	
					Computational protein design and engineering					Predicting thermodynamic & transport properties of ionic	
										Self-Assembly of nanoparticle superlattices	
										Binary adsorption in metal-organic frameworks	
										Yield stress determination	
										Molecular simulation of biomass dissolution	
										Noninvasive imaging of gastric extrusion	
										Molecular dynamics and simulations	
	Carbon Sequestration				CO2 utilization	CO2 capture and storage, adsorption, membrane		CO2 sequestration		Ionic Liquids	Work with the National Carbon Capture Center and Design and analysis of catalysts
	Catalysis		Artificial Photosynthesis	Heterogeneous catalysis			Heterogeneous catalysis	Catalysts and sensors	Solar Fuel Catalysts	Sensors	
				C1 catalysis					Heterogeneous Catalysts	Synthesis of efficient oxide-supported noble metal catalysts	
										Novel quaternary ammonium salts	
										Supercritical Fluids	
										Phase - Transfer Catalysis	
										Noble metal catalysts	
										Phase-transfer catalysis	
										Activated carbons	
										Supercritical Fluids	
										Zeolites	
										Mesoporous materials	
										Microporous materials	
	Environmental Chemistry and Toxicology						Ionic Liquids	Biochemical and Molecular Toxicology		Environmental Chemistry and Toxicology	Remediation of petroleum contaminated soils
										Ionic Liquids	
										Volatile organic compound (VOC) emissions	
	Surface Chemistry			Surface Chemistry				Raman Spectroscopy Studies of Bioactive Materials	Surface Chemistry	Surface Chemistry	
										Adsorption	
										Multicomponent adsorption	
	Polymer and Material Chemistry		Polymer coated metal nanoparticles and nanotubes	Polymer material science	Polymer chemistry: Nanoparticle catalysis, nanoparticle synthesis, surface deconstruction			Polymer chemistry, materials chemistry	Polymers	Materials Chemistry	
								Polymeric Materials for Water Purification		Additive Manufacturing (Polymers)	
								polymer coatings		Ionic Liquids	
								Bionanotechnology			
	Crystallography							Small Molecule Crystallography	Crystal Growth	Crystallography	
								Protein Crystallography for Drug Design			
	Biochemistry			Photosynthesis				Nanotechnology for Biomedical sensing	Biochemistry		
	Medical Chemistry				Computational protein design and engineering		Alabama Life Research Institute	Drug Design and Development	Natural Products	Novel Chemical Development of Cancer treatment, diagnosis and analysis	
								Medicinal chemistry			
	Low Temperature Plasma					plasma induced nanoparticles synthesis		Microwave Plasma Synthesis and Processing of superhard Materials	Plasma Induced chemical reactions	Combustion For Micro-Thrusters	

	HudsonAlpha	AAMU	ASU	AU	TU	UA	UAB	UAH	USA	SR
Propulsion Systems		Airbreathing Propulsion / Chemical Reacting System			Energy Device Characterizations	Internal combustion engines		Power Systems	Combustion in rocket engines	Propulsion materials development and testing
		Turbomachinery System Design and Integration				Advanced vehicle systems and components		Propulsion	Electric sails	
		Computational Fluid Dynamics				Traditional and alternative fuel combustion			Supersonic vehicles	
		Hypersonics, Reentry aerodynamics, Rocket Propulsion							Space propulsion systems	
		Aerothermodynamics, Heat Transfer							Unmanned aerial vehicles	
Power Grid Technology				Optimization of electric power systems	Distributed co-operative control, optimization and stability of power systems	Building energy and HVAC systems	Sustainable Smart Cities Research Center	Smart Grids	Smart Grid	Batteries for grid storage
					Particle swarm optimization applied to power systems	Alabama Cyber Institute		Power Line Reliability	Gas Turbine Technology / Power Generation	
					Renewable energy integration and micro-grid simulations				Micro grid power distribution	
					Smart grid data analysis				Flexible power management devices	
					Dynamic Co-operative Distributed Control and Optimization of Power Systems with Integrated Renewable Energy Systems Using Game Theory				Virtual power plants	
					Particle swarm optimization test bed for power loss in transmission lines				Wide area power monitoring	
					Hardware-In-The-Loop Simulation of Power Systems, Smart Grid				Inductive power transfer (IPT)	
					Real-time Statistical Analysis of Smart Grid Data				Power management devices	
									Distributed generation	
									Renewable & alternative energy systems & virtual power plants	
									Integration of renewables w/smart grid	
									Phasor measurement units & wide area monitoring systems	
									Multi-agent systems & distributive control	
									Energy storage systems	
									AI in power system problems	
									Transcenduous energy transmission	
									Power systems	
									Pulsed power	
Energy storage			Artificial Photosynthesis	Thermal management for battery systems	Fuel Cell Science and Technology	Chemical approaches to energy storage	Solid oxide fuel cell materials	Batteries and Advanced Energy Storage	Natural Gas Storage	Solar and energy storage for grid-ready
					Conversion of water into hydrogen energy	Next generation batteries	Energy systems modeling	Industrial Control Systems	Power-to-gas for energy storage	Repurposing of electric vehicle batteries
					Thin film Super-capacitors, Light weight energy storage	Used battery recovery	Power system protection and control, fault detection hardware		Use of power-to-gas to generate synthetic natural gas	Lithium process technology
					Energy Storage Modeling and Simulation For Renewable Energy Systems				Use of repurposed electric vehicle batteries	High temperature energy storage using sorbents
					Radiant Heat Control for Solar HVAC Application				Energy storage systems	
					Dynamic Analysis Tool for Renewable Energy/Grid Integration				Hydrogen Storage	
									Ionic Liquids	
									Home Energy Monitoring	
									Battery Technology	
									Rapid Charging Technology	
									Synthetic natural gas	
									Energy storage and harvesting	
									Direct energy conversion	
									Renewable energy	
									Thermoelectric power generators	
									Batteries for electric vehicles	

		HudsonAlpha	AAMU	ASU	AU	TU	UA	UAB	UAH	USA	SR
Energy	Biofuels	Cellulosic crop and biomass genomics	Biofuels (Diesel)	Photosynthesis	Bioenergy Production and Bioproducts		Bioreactors for fuel and fine chemical production	Microbiological energy production	Energy Efficiency & Environmental Sustainability	Biomass Processing	Biomass gas to liquids
		Plant Genomics/Genetics	Biomass Production		Growing and harvesting Bioenergy fuels		Alternative fuels		Biofuels	Bioenergy and biofuels	
		Plant Genome Sequencing			Biogas conversion					Renewable natural gas	
		De novo assembly of complex plant genomes								Molecular simulations of biomass dissolution	
	Wind and Solar		Wind Turbine	Solar Energy Production	Wind and solar engineering	Conversion of solar energy, mechanical energy, chemical into electrical energy	Photovoltaic materials		Photon and Particle Sensing Technology	Multijunction solar cells	Testing and Optimization of commercial panels
						Wind/photo-voltaic (PV)/fuel cell modeling, simulation and control			Solar/Wind/Hydro Modeling	Radiation-hard solar cells	
						Hardware validation of Wind/PV/fuel Cell-Grid Models				PhotoElectroChemical (PEC) hydrogen production	
						Wind and Solar Modeling and Energy Prediction				Photovoltaic devices	
						Renewable Energy, Power Systems Analysis					
	Pollution control				Biogas conversion					Carbon Capture	Broad range of technology and testing for air pollution control from fossil fuels
					Erosion and sediment control					Ionic Liquids	Carbon capture at power plant stage (Wilsonville, AL)
										Wastewater Treatment; Bioremediation; Solid Waste Mgt	Fuel and chemical production for waste streams
										Wind/solar Monitoring via the South Alabama Mesonet (http://chilweeb.southalabama.edu)	
	Hydro-carbon energy				Hydrocarbon Systems				Combustion	Petroleum Geology	Hg testing from fossil fuels
	Modeling and Engineering		Population, system testing		Process intensification						Full Modeling and Process Engineering
			Thermodynamics and Fluid Mechanics		Building energy simulations						
			Modeling and Simulation								
			Civil Engineering								
	High Temperature Materials				High Temperature Materials						Full Materials Characterization Capability at extreme temperatures
	Low Temperature Plasma		Plasma Radiation		Energy cascade and transport for understanding the thermodynamic properties of plasmas		Satellite Propulsion, Space systems		Electric propulsion, plasma assisted combustion	Small Satellite Propulsion	

Forestry Products/Natural Resources		HudsonAlpha	AAMU	ASU	AU	TU	UA	UAB	UAH	USA	SR
Surface Water Resources			Water Resources		Water Resources		Flood forecasting	Storm water impacts	Hydrology	Water management and treatment	
			Stream Water Quality		stream water quality		Drought management	Disaster assessment	Stream Water Quality	Coastal resilience and vulnerability	
					Wetland Management		Stream water quality			Coastal wetland management	
					Flood forecasting		Aquatic ecology			coastal flooding	
					Aquatic ecology		Modeling and Remote Sensing			Sea level rise	
							Water Security and Risk Communication			Drinking water, wastewater, & storm water treatment	
										Natural hazards	
										Onsite & Small-Community Wastewater technologies & management	
										Decentralized wastewater technologies & concepts	
										Micro-pollutants in wastewater	
										Low-impact development practices	
										Development & evaluation of adaptation strategies to sea-level rise	
										Living shorelines	
Soil and Groundwater Resources			soil moisture		Soil fertility management		Soil moisture			Remediation of groundwater systems	
			Soil fertility management		Soil contamination		Groundwater management			Environmental monitoring	
					Groundwater remediation		Groundwater remediation			Wetlands	
					Saltwater intrusion in coastal system		Saltwater intrusion in coastal systems			Coastal community resiliency	
										Post-disaster structural & geotechnical evaluation	
										Constructed wetlands for wastewater & storm water treatment	
										Coastal structures & interaction w/morphological changes	
										Volatile organic compound (VOC) emissions	
Infrastructure and technologies for water management					Drinking water treatment	Wastewater treatment	Drinking water treatment		Drinking water treatment	Wastewater treatment	
					Wastewater treatment	Membrane technologies	Wastewater treatment		Wastewater treatment	High-resolution numerical modeling of coastal processes	
					Stormwater design		Membrane technologies		BMPs for storm water management	Nature-based shore protection	
					water distribution network design		Water quality monitoring tools			Coastal mapping, monitoring, and measurement studies	
Environmental Health and Modeling			Wildlife Management		Sustainable, healthy wildlife populations		Environmental Science and Health		Environmental Engineering	Insect Phenomology	
			Aquatic Ecology		Carbon Sequestration				Genetics	Environmental monitoring	
			Forest Fire fighting technology		Environmental Health for Humans				Combustion	Wetlands	
			Forest Ecology		Control of animal and plant invasive species					Volatile organic compound (VOC) emissions	
			Ecology		Modeling of climate influences on forests, wildlife, and people					Pharmaceuticals in the environment; Pharmaceutical bioremediation	
					Socioeconomic factors					Micro-pollutants in wastewater	
Biofuels and Products		Plant Functional Genomics/Genetics	Wood Products Technology		Expanding products, reducing manufacturing costs	Lignocellulose extraction	Sustainable Energy		Natural Products Chemistry	Biomass dissolution	Biomass sugars to chemicals process technology
		Plant Genome Sequencing	Biofuels		Lowering transportation costs for bioenergy feed stocks	Biopolymers	Alternative Fuels		Fermentation	Bioenergy and biofuels	biomass to liquid fuel process technology
		De Novo assembly of complex genomes			Metabolic engineering for energy production	Biocomposites	Liquid biofuels/combustion technologies			Molecular simulations of biomass dissolution	
						Bioenergy/Biorefinery Technologies, Pulp and Paper Process Engineering					
						Biodiesel from vegetable oils with honeycomb monolithic catalysts					
Atmospheric Science			Aerodynamics				Remote Sensing Center		Weather/Climate Models	Atmospheric monitoring using the South Alabama Mesonet (http://chilweb.southalabama.edu)	
			Computational Atmospheric Science						Atmospheric Science	Hurricane research	
										Monitoring atmosphere using unmanned arial vehicles	
										Weather Analysis & Prediction	
										Severe Local Storms/Extreme Weather Events	
										Monitoring/investigating local weather	

Information Technology and Cybersecurity

	HudsonAlpha	AAMLU	ASU	AU	TU	UA	UAB	UAH	USA	SR
Bioinformatics	Bioinformatics and Data Analysis	Bioinformatics						Biometrics		
Security		Network Security	Software engineering, reliable and secure software development	Cyber Vulnerability Assessment	Security and Privacy, Wireless Networks, Cyber Physical Systems	Alabama Cyber Institute	Cryptography	Software Safety	Smart Grid	
		Cyber Forensics	Cybersecurity	UAV Security		Software reliability and security	User and Device Authentication	UAS Security	Medical Applications	
		Information Assurance		High performance computing intrusion detection		Network security	Mobile Device Security	Industrial Control System Security (SCADA)	Computational genomics	
		Security within the Internet of Things		Cyber security for advanced manufacturing		Cyber Security	Vehicle Cyber Security	Automotive security/ smart car research	Hardware-enabled privacy	
		Pervasive Computing Security		Homeland security		Cyber Infrastructure Protection	Device Design for Cyber Security, Signal Processing, Embedded Systems		Server-Area Networking	
		Cloud security		Cyber security for IOT			Digital Forensics and Cybercrime Investigation		Embedded Systems	
		Virtualization security		Cyber identity protection and privacy			Financial Service Security		Digital Forensics	
							Blockchain and Cryptocurrencies		Software Protection	
							Cloud Computing Security		Server-Area Networking	
							Security of Internet of Things		Embedded Systems	
							Quantum Computing		Digital Forensics	
									Software Protection	
									Cloud Security	
									Cyber Physical Systems	
									Side Channel Analysis	
									Voting Systems	
									Insider Threats	
									Supply-Chain Security	
									Malware Analysis	
									Electronic Medical Device Security	
									Penetration Testing	
									Mobile Device Protection	
									Cyber security	
Big Data	Big Data	Big Data	Reliable and secure software development	Internet of Things	Big Data Analysis	Data analytics	Big data analytics	Data mining	Neural networks	
	Biological meta analysis	Data Mining	Big Data	IoT - building sensors for facilities management	Data Mining		Data Mining	Big Data	High-performance computing	
	Bioinformatics and Study Design	Live road mapping for autonomous vehicles	Data Mining- using Tableau and Power BI				Analytics for Forensics, Cybercrime, and Biomedical Applications		Database design & development	
		Hyperspectral data cube					Data Visualization		bioinformatics	
Artificial Intelligence Machine Learning		Automatic target recognition	Artificial Intelligence Machine Learning	Agent-directed simulation	Artificial Intelligence, Machine Learning, and Smart Health Networks	Artificial Intelligence Machine Learning	Machine learning	Machine Learning	Machine Learning	Machine learning for robotic platforms
		Machine Vision		Identity science		Cyber-Physical Systems	AI-Signal Processing		Ontology	
		Robotics and Automation				Cyber Infrastructure			Neural networks	
		Deep Learning							Neuromorphic computing	
		Virtual reality							Intelligent computing hardware	
									AI in weather forecasting	
									AI in transportation, geometric design, & optimization	
									AI in power system problems	
									AI technology	
									Intelligent data-enabled computing circuits/systems	
									AI in advanced manufacturing	
									Application of AI in Manufacturing	
Modeling and Image Processing		Computer Graphics	Modeling and Simulation	Imaging processing and analysis	Signal/Image Processing, Sensor Data Analytics, Intelligent Systems	Geographic information systems	Clinical Information Extraction	Control Theory	Optimization algorithms	Image processing for ISR applications
		Image processing		VIR/MIR applications for building inspection, maintenance & safety	Statistical Signal and Image Processing	Alabama Cyber Institute	Image/Video Processing	Image Processing	Optimization of systems	
		Hyperspectral Imaging System		Drone technology for buildings	Modeling and Simulation of Systems (Communications, Bio, UAV, Vehicles)		Scientific Visualization	Modeling and Simulation	Image processing	
		Compter Simulation			Automatic Target Detection and Tracking		Shape Modeling	Visualization and Graphics	Hyperspectral Imaging	
									High-resolution numerical modeling of coastal processes	
									Pavement Performance & modeling	
									Models of semiconductor avalancheing	
									Modeling, simulation, & reconstruction of DNA	
									Modeling strain gradient elasticity	
									Dynamic modeling of space tethers	
									Airfoil design & modeling	
Software engineering	Genomics Analysis Pipeline Development	Formal Analysis of Software Architecture	Software Engineering	Software Engineering		Research Software Engineering	Distributed Software Systems	Software Engineering	Predictive Analytics	Full software development capabilities
	Clinical Genomics Software for CLIA certified use	Software Testing and Software Quality Assurance					Secure Software Development	Gaming		
	Bioinformatics and Data Analysis	Game design and Development					Software Systems for Massive Datasets	Software metrics		
		Mobile application development					New Programming Languages			
Low Temperature Plasmas				High speed imaging and image processing						
				High performance computing of atomic processes in plasmas						

Metal and Advanced Materials

	HudsonAlpha	AAMU	ASU	AU	TU	UA	UAB	UAH	USA	SR
Chemical Property Analysis and Testing		Mechanical Property Testing	Forensic Drug Analysis	In situ/operando spectroscopy	Plasticity and dislocation dynamics	Alabama Analytical Research Center	Analysis of Chemical Structure Physical/ Optical Function	Surface characterization of Polymers, Ceramics, and Metals	Dynamic fracture mechanics	Surface and other capabilities for characterization
		Crystal Growth			low temp optical growth of semiconductors		Optical/ Nonlinear Optical Testing		Void and defect characterization	
					material detection and classification				Extrusion	
									Monolayer mechanics and stress microscopy	
									Thermal Degradation Analysis	
									Stress analysis	
									Multi-scale modeling	
									Noninvasive imaging of paste extrusion	
									Yield stress determination	
High magnetic materials						Magnetic materials	Development and Testing of Nanostructured Superconducting Materials		Superconductors	
Materials Processing and Chemistry		Material Processing		Process and Fabrication (metal casting and microjoining)	Metal coatings and corrosion	Materials Chemistry	Low cost carbon and, natural fiber materials, reinforced ceramics	Material Science	Steel Structural Engineering	Material processing modeling
					Welding and repair of rail steel and thick section structures	Solid State Chemistry	Biodegradable Composite Materials	Bioprocesses	Lanthanide and Actinide Chemistry	
					Characterization of high-Z materials	Integrated computational materials engineering		Structural Engineering	Advanced Metal Casting Technology	
					Fracture and failure analysis	Metal casting and solidification		Friction Stir Welding	Metasurfaces and metamaterials	
								Reliability and Failure Analysis	Micro/nano-fluids and suspensions	
									Microporous materials	
									Carbon Filter Composites	
									Additive Manufacturing	
									Polymer composites	
									porous media	
Smart Materials		Energy Harvesting		Adaptive (bio, acoustic wave, and electrochemical) Sensors	semiconductor thin film techniques	Alloy formulation and characterization	Semiconductors, complex materials	Advanced Composites	Carbon Filter Composites	Composite fabrication capabilities
		Material Fabrication and Doping Materials		Smart Nanomaterials and Nanocomposites	flexible electronics	Spintronic materials	Metamaterials for wireless sensing	Smart Buildings	Smart Fabrics	
		Solution Casting				Carbon materials	HLSA cast material, 7000 series as cast aluminum	Quantum Dots	Ionic Liquids Composites	
						Two-dimensional quantum materials	Low RE containing magnesium alloys, computational alloy design		Sensor Embedded	
						Micro and nanostructure characterization				
Low Temperature Plasma				Plasma erosion of surfaces, atomic processes at plasma-surface interfaces	Surface modification of nanoparticles, metals metal oxides, alloys and polymer for compatibility	Surface Interactions, Low work function materials		surface treatment		
Electronic and optical materials		Device fabrication (etching, metalization)		Laser-based optical methods		Photonics and biophotonics	Electronic and optical materials	Optics Tight Binding Models	Electrical Insulation	Optics and electro-optics manufacturing under 60 and 75 for military applications
		Ion bombardment/implantation (material modification)		wide band-gap semiconductors, metal-oxide material					Defects in semiconductors	Electronic packaging materials modeling and characterization
		Electron microscopy							Dielectrics	
		Energy (RBS) and Gamma spectroscopy							Electrorheological fluids	
		Infrared imaging							Magnetorheological fluids	
									Radiation-hard electronic materials	
									Advanced materials for PhotoElectroChemical hydrogen production	
									Compact plasma switches	
									Pulsed plasmas	
									Models of semiconductor avalanche	
Extreme materials		in-situ extreme heat/cold characterization		High Temperature Materials	High strength low alloy steels		Materials under extreme pressure and electromagnetic fields		Superconducting devices	Full Materials Characterization Capability @ extreme temperatures
							High temperature ceramic materials			
Materials treatment		Laser Treatment					New Coating Technologies	Surfaces and Interfaces		Full Materials Characterization at extreme temperatures
		Ion bombardment						UV Processing		
Nuclear Material Safety		Nuclear Material Safety								