סיכום

ARMY RESEARCH LABORATORY BROAD AGENCY ANNOUNCEMENT (BAA) FOR BASIC AND APPLIED SCIENTIFIC RESEARCH

**a. CORE COMPETENCY 1: MATERIALS SCIENCES**

**1.1 Structural Materials and Components**

1.1.1. Composite Materials

1.1.2. Advanced Materials and Materials Processing.

1.1.3. High Rate Deformation and Failure of Materials.

1.1.4. Structural Mechanics.

1.1.5. Multifunctional Structures.

1.1.6. Adaptive Structures.

1.1.7 Nanomaterials Processing

1.1.8 Coatings and Corrosion Science.

**1.2 Electronic Materials and Devices**

1.2.1. MicroElectroMechanical Systems (MEMS).

1.2.2. Nanoelectronics and Nanosensors for Army Applications

1.2.3. Piezoelectric MicroElectroMechanical Systems (PiezoMEMS) Technology

1.2.4. Emerging Technologies for Semiconductors.

1.2.5. Small RF (micro-sensor) Systems

1.2.6. Microwave Device and Analog Signal Processing Research and Development

1.2.7. Broadband Analog, Microwave, Millimeter-wave and Mixed-signal Integrated Circuits

and Processing Architectures.

1.2.8. Frequency Control.

1.2.9 High Power RF Sources and Amplifiers.

1.2.10 RF-to-THz Devices and Integrated Circuit Technology

1.2.11 RF Wide Band Gap Semiconductors, Devices, and Circuits.

1.2.12. Antenna Front End and Receiver Technology for Multi-Function Radio Frequency Architectures.

1.2.13. Conformal Antennas.

1.2.14. Vehicle Integrated Antenna Technologies.

1.2.15. Millimeter-wave and Sub-millimeter-wave Sensor Technology.

1.2.16. Next Generation Digital Imaging.

1.2.17. Electronic Warfare/Electronic Attack (EW/EA).

1.2.18. Prognostics & Diagnostics.

1.2.20. Bio-/Neuro-inspired Sensing and Information Management.

1.2.21. Quantum, Bio, and Flexible Materials for Next Generation Electronics

**1.3 Photonic Materials and Devices**

1.3.1. Photonic Devices and Modules.

1.3.2. Novel Optical Processing Algorithms and Techniques.

1.3.3. EO/IR Sensors.

1.3.4. Infrared Detectors & Power Sources.

1.3.5. Novel and Highly Scalable Diode-Pumped Solid State Lasers

1.3.6. Hyperspectral/Multispectral/Polarization Imaging.

1.3.7. Luminescent Materials and Devices.

1.3.8 Nonlinear Optics.

1.3.9. Biologically Inspired and Biologically Derived Sensor, Power, Device and Materials

Research.

1.3.10. Advanced Concepts for Hazardous Material Sensing Applications.

1.3.11. Technology Demonstrations and Assessments for Special Operations and Low Intensity Conflict (SOLIC).

1.3.12. Technology Demonstrations and Assessments for Department of Defense Biometrics.

**1.4 Energy Materials and Components**

1.4.1. Electrochemical Power Production and Energy Storage.

1.4.2. Power Conditioning.

1.4.3. Wide Band-Gap Power Devices.

1.4.4. Microsystems Technology for Power Generation and Energy Conversion Components.

1.4.5 Ultra-Energetic Materials and Energy Storage.

1.4.6 Nuclear Detection and Sensors.

1.4.7 Superconducting Materials.

1.4.8 Energy Materials and Components.

1.4.9 Tactical Energy Networks/Microgrids

**b. CORE COMPETENCY 2: BALLISTICS & AEROMECHANIC SCIENCES**

**2.1 Energetics and Propulsion Science**

2.1.1. Novel Insensitive Energetic Materials.

2.1.2. Laser-matter Interactions.

2.1.3. Innovative Engine Technologies.

2.1.4. RESEARCH DRIVETRAIN AND TRIBOLOGY PROPULSION.

2.1.5. Rotorcraft Research.

2.1.6. High Temperature Propulsion Science.

2.1.7. Spray and Combustion.

**2.2 Impact Physics**

2.2.1. Warhead and Penetrator Technology.

2.2.2. Human Incapacitation – Penetration of Soft Tissue.

2.2.3. Armor Technology for Warhead Defeat.

2.2.4. Early Detection and Vehicle Response to Underbody Blast Events

2.2.5 Ballistic Launch and Transitional Ballistics

2.2.6 Munition systems research.

2.2.7 Human Response to Ballistic Loading.

**2.3 Aeromechanics**

2.3.1. Rotorcraft Aeroelasticity.

2.3.2. Vehicle Dynamics.

2.3.3. Vehicle Integrated Analysis Technologies.

2.3.4. Affordable Precision Munition Technologies

2.3.5 Weapon and Ammunition Accuracy.

**2.4 Ballistic Vulnerability**

2.4.1. Weapons Effectiveness.

2.4.2. Fundamental Basis for Survivable Systems Subjected to Multi-physics, Multi-phase

Asymmetric Threats.

**c. CORE COMPETENCY 3: INFORMATION SCIENCES**

**3.1 Network Sciences**

3.1.1. Network Theory.

3.1.2. Secure Wireless Mobile Communications.

3.1.3. Sensor Network Communications.

3.1.4. Cyber Defense and Information Assurance.

3.1.5. Unattended Ground Sensor (UGS) Technology.

3.1.6. Disposable Sensor Technology.

**3.2 Decision Support Sciences**

3.2.1. Information Science and Technology.

3.2.2. Natural Language Processing (NLP).

3.2.3. Software Technologies Targeting Interoperability for Systems of Systems.

3.2.4. Computational Social Science.

3.2.5. RF Phenomenology, Signal Processing and System Design.

3.2.6. Image Processing (IP).

3.2.7. Acoustic Technology.

3.2.8. Sniper and Artillery Location Technology.

3.2.9. Electric Field Sensor Technology.

3.2.10. Passive Magnetic Sensor Technology.

3.2.11. Sensor, Data and Information Fusion

3.2.12. Quantitative Technology Assessment.

3.2.13. Technology Demonstrations and Assessments for Counter Insurgency Operations

**3.3 Computational Sciences**

3.3.1. Simulation-Based Engineering Sciences.

3.3.2. Quantum Information Science.

**3.4. Autonomy**

3.4.1. Tactical Mobile Robotics.

3.4.2. Micro Autonomous Systems and Technology (MAST).

3.4.3. Robotics Science and Technology.

3.4.4 Intelligent Systems

**3.5 Atmospheric Sciences**

3.5.1 Atmospheric Sensing and Characterization

3.5.2 Atmospheric Modeling and Decision Aids.

3.5.3 Intelligent Atmospheric Optics Systems for Army Battlefield Applications

**3.6 Electronic & Information Warfare Vulnerability**

**d. CORE COMPETENCY 4: HUMAN SCIENCES**

**4.1 Soldier Performance**

4.1.1. Soldier Performance Research

4.1.2. Neuroscience

4.1.3. Social/Cognitive Network Science

**4.2 Simulation and Training**

4.2.1. Adaptive and Intelligent Training Technologies

4.2.2. Advanced Distributed Simulation

4.2.3. Immersive Learning

4.2.4. Synthetic Environments

4.2.5. Three-Dimensional (3D) Holography Modeling and Simulation

4.2.6. Training Application Environments: Ground

4.2.7. Training Application Environments

4.2.8. Training Application Environments Dismounted Soldier

4.2.9 Advanced Situational / Battlespace Awareness

**4.3 Human Systems Integration**

4.3.1 Human Systems Integration (HSI) Human Performance and Accommodation Modeling

Tools and Techniques-Development

4.3.2 Human Robotic Interaction (HRI)

**e. CORE COMPETENCY 5: SURVIVABILITY, LETHALITY, AND VULNERABILITY ANALYSIS AND ASSESSMENT**

**5.1 Ballistic Vulnerability Analysis and Assessment**

5.1.1. Vulnerability Research and Analysis for Under-body Blast.

**5.2 Electronic & Information Warfare Vulnerability Analysis and Assessment**

5.2.1. Radio Frequency Directed Energy (RFDE)/ High Power Microwave

(HPM)/Electromagnetic Effects/ Electromagnetic coupling phenomena/ Electromagnetic Energy/Electronic Warfare (EW) Survivability.

5.2.2. RF Digital Models/Simulations.