Exhibit R-2, RDT&E Budget Item Justification: PB 2012 Air Force										DATE: February 2011	
APPROPRIATION/BUDGET ACTIVITY 3600: *Research, Development, Test & Evaluation, Air Force* BA 2: *Applied Research*				R-1 ITEM NOMENCLATURE PE 0602102F: *Materials*							
COST ($ in Millions)	**FY 2010**	**FY 2011**	**FY 2012 Base**	**FY 2012 OCO**	**FY 2012 Total**	**FY 2013**	**FY 2014**	**FY 2015**	**FY 2016**	**Cost To Complete**	**Total Cost**
Total Program Element	177.238	137.273	136.230	-	136.230	136.277	135.681	138.778	141.429	Continuing	Continuing
624347: *Materials for Structures, Propulsion, and Subsystems*	109.378	84.865	81.915	-	81.915	81.785	81.117	81.449	83.042	Continuing	Continuing
624348: *Materials for Electronics, Optics, and Survivability*	33.109	31.687	30.421	-	30.421	30.442	30.566	30.846	31.415	Continuing	Continuing
624349: *Materials Technology for Sustainment*	22.361	16.893	20.052	-	20.052	20.158	19.998	22.341	22.744	Continuing	Continuing
624915: *Deployed Air Base Technology*	12.390	3.828	3.842	-	3.842	3.892	4.000	4.142	4.228	Continuing	Continuing

A. Mission Description and Budget Item Justification

This program develops advanced materials, processing, and inspection technologies to reduce life cycle costs and improve performance, sustainability, availability, affordability, supportability, reliability, and survivability of current and future Air Force systems and operations. The program has five projects that develop: (1) the materials and processing technology base for spacecraft and launch systems; (2) structural, propulsion, and sub-systems materials and processes technologies; (3) electronic, optical, and survivability materials and processes technologies; (4) sustainment materials, processes technologies, and advanced non-destructive inspection methodologies; and (5) air base operations technologies including deployable base infrastructure, force protection, and fire fighting capabilities. Efforts in the program have been coordinated through the Reliance 21 process to harmonize efforts and eliminate duplication. This program is in Budget Activity 2, Applied Research, since it develops and determines the technical feasibility and military utility of evolutionary and revolutionary materials technologies.

B. Program Change Summary ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total
Previous President's Budget	179.202	137.273	135.649	-	135.649
Current President's Budget	177.238	137.273	136.230	-	136.230
Total Adjustments	-1.964	-	0.581	-	0.581
• Congressional General Reductions		-			
• Congressional Directed Reductions		-			
• Congressional Rescissions	-	-			
• Congressional Adds		-			
• Congressional Directed Transfers		-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-1.968	-			
• Other Adjustments	0.004	-	0.581	-	0.581

Exhibit R-2, RDT&E Budget Item Justification: PB 2012 Air Force	DATE: February 2011
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Congressional Add Details ($ in Millions, and Includes General Reductions)	**FY 2010**	**FY 2011**
Project: 624347: *Materials for Structures, Propulsion, and Subsystems*		
Congressional Add: *Air Force Minority Program*	4.780	-
Congressional Add: *Carbon Nanomaterials for Advanced Aerospace Applications*	0.797	-
Congressional Add: *ONAMI Safer Nanomaterials and Nanomanufacturing*	3.505	-
Congressional Add: *Consortium for Nanomaterials for Aerospace Commerce and Technology (CONTACT)*	3.187	-
Congressional Add: *Advanced Aerospace Carbon Foam Heat Exchanges*	3.187	-
Congressional Add: *Institute for Science and Engineering Simulation/Aircraft Fatigue Modeling and Simulation*	3.585	-
Congressional Add: *Development of Mobile Wind Turbine Systems to Power Forward Bases*	1.195	-
Congressional Add: *Aerospace Laser Micro Engineering Station*	0.797	-
Congressional Add: *Hybrid Nanoparticle-based Coolant Technology Development and Manufacturing*	0.797	-
Congressional Add: *Lightning Protection Composites*	2.987	-
Congressional Add: *Ultra-high Temperature Materials for Hypersonic Aerospace Vehicles*	2.390	-
Congressional Add: *Pennsylvania Nanomaterials Commericialization Center*	0.797	-
Congressional Add Subtotals for Project: 624347	28.004	-
Project: 624348: *Materials for Electronics, Optics, and Survivability*		
Congressional Add: *Large Area, APTV Materials Development for High Power Devices*	1.593	-
Congressional Add: *Mid-IR Laser Materials*	0.797	-
Congressional Add: *Low-Defect Density Gallium Nitride Materials for High-Performance Electronics Devices*	2.788	-
Congressional Add: *Gallium Nitride (GaN) Microelectronics and Materials*	1.593	-
Congressional Add Subtotals for Project: 624348	6.771	-
Project: 624349: *Materials Technology for Sustainment*		
Congressional Add: *Accelerated Insertion of Advanced Materials and Certification for Military Aircraft Structure Materials Substitution and Repair*	1.992	-
Congressional Add: *Conducting Polymer Stress and Polymer Damage Sensors for Composites*	2.868	-
Congressional Add: *LGX High Temperature Acoustic Wave Sensors*	1.593	-

Exhibit R-2, RDT&E Budget Item Justification: PB 2012 Air Force	DATE: February 2011
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Congressional Add Details ($ in Millions, and Includes General Reductions)	**FY 2010**	**FY 2011**
Congressional Add: *Hybrid Materials Integration (HMI)*	1.992	-
Congressional Add Subtotals for Project: 624349	8.445	-
Project: 624915: *Deployed Air Base Technology*		
Congressional Add: *Fire and Blast Resistant Materials for Force Protection*	3.187	-
Congressional Add: *Energy Efficiency, Recovery, and Generation (ENERGy)*	0.996	-
Congressional Add: *Fine Water Mist Fire Suppression Technology to Replace Halon*	1.992	-
Congressional Add: *Partnership for Energy and Automation Technologies*	1.593	-
Congressional Add: *Temperature Resistant Landing Pad Jet Blast Protection*	0.797	-
Congressional Add Subtotals for Project: 624915	8.565	-
Congressional Add Totals for all Projects	51.785	-

Exhibit R-2A, RDT&E Project Justification: PB 2012 Air Force			DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 3600: *Research, Development, Test & Evaluation, Air Force* BA 2: *Applied Research*	R-1 ITEM NOMENCLATURE PE 0602102F: *Materials*	PROJECT 624347: *Materials for Structures, Propulsion, and Subsystems*	

COST ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total	FY 2013	FY 2014	FY 2015	FY 2016	Cost To Complete	Total Cost
624347: *Materials for Structures, Propulsion, and Subsystems*	109.378	84.865	81.915	-	81.915	81.785	81.117	81.449	83.042	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project develops the materials and processing technology base for aircraft, spacecraft, launch systems, and missiles to improve affordability, maintainability, and performance of current and future Air Force systems. A family of affordable lightweight materials is being developed, including metals, polymers, ceramics, metallic and nonmetallic composites, and hybrid materials to provide upgraded capabilities for existing aircraft, missile, and propulsion systems to meet the future system requirements. Develops high-temperature turbine engine materials that will enable engine designs to double the turbine engine thrust-to-weight ratio. Advanced high temperature protection materials are being developed that are affordable, lightweight, dimensionally stable, thermally conductive, and/or ablation and erosion resistant to meet aerospace and missile requirements. Alternative or replacement materials are being developed to maintain the performance of aging operational systems. Materials for thermal management including coolants, adaptive thermally conductive materials, coatings, friction and wear-resistant materials, and other pervasive nonstructural materials technologies are being developed for directed energy, propulsion, and subsystems on aircraft, spacecraft, and missiles. Develops nanostructured and biological materials for aircraft structures, munitions, air vehicle subsystems, and personnel. Develops novel materials for electromagnetic interactions with matter for electromagnetic pulse (EMP), high power microwave, and lightning strike protection. Concurrently develops advanced processing methods to enable adaptive processing of aerospace materials.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total
Title: Major Thrust 1	11.216	13.073	12.630	-	12.630
Description: Develop ceramic, ceramic matrix composite, and hybrid materials technologies for performance and supportability improvement in propulsion systems and high temperature aerospace structures.					
FY 2010 Accomplishments: Completed validation of advanced ceramic composite performance through testing under real and simulated engine service life conditions. Validate the life prediction model to address time dependent degradation associated with environmental exposure. Validate the severe environment durability of advanced ceramic composite systems with advanced interfaces via mechanical testing. Completed development of new spacecraft catalyst bed systems. Assessed performance of ultra high temperature ceramics leading edges in a relevant hypersonic environment (arc jet test rig) and validated oxidation models. Validated materials and materials process technologies for application in combined optical and radio frequency communication system apertures.					
FY 2011 Plans:					

Exhibit R-2A, RDT&E Project Justification: PB 2012 Air Force		DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 3600: *Research, Development, Test & Evaluation, Air Force* BA 2: *Applied Research*	R-1 ITEM NOMENCLATURE PE 0602102F: *Materials*	PROJECT 624347: *Materials for Structures, Propulsion, and Subsystems*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total
Initiate development of new advanced processing methods, environmental coatings, and life prediction for higher temperature capable ceramic matrix composites. Continue validation of the life prediction model to address time dependent degradation associated with environmental exposure. Continue validation of the severe environment durability of advanced ceramic composite systems with advanced interfaces via mechanical testing. Initiate development of new ceramic matrix composite systems with higher temperature capability. Completed assessment of thermal protection system materials for hypersonic applications. Continue development of suitable materials and materials process technologies for application in combined optical and radio frequency (RF) communication system apertures. ***FY 2012 Base Plans:*** Advance development of new advanced processing methods, environmental coatings, and life prediction for higher temperature capable ceramic matrix composites. Continue validation of the life prediction model to address time dependent degradation associated with environmental exposure. Continue validation of the severe environment durability of advanced ceramic composite systems with advanced interfaces via mechanical testing. Continue development of new ceramic matrix composites systems with higher temperature capability. Continue validation of suitable materials and materials process technologies for applications in combined optical and radio frequency (RF)communication system apertures. Initiate development of new hybrid materials and materials process technologies for applications in combined optical and radio frequency (RF) communication system apertures. ***FY 2012 OCO Plans:***					
Title: Major Thrust 2 ***Description:*** Develop nanostructured materials and nanoscale architectures to address electromagnetic applications. Develop metamaterials for sensors, antennas, electronics, and optical elements. ***FY 2010 Accomplishments:*** Explored material concepts for adaptive and multifunctional aircraft structures. Explored low-cost processing methodologies for photovoltaics for Remotely Polited Aircraft (RPA) applications. Explored new materials systems and nano geometries to improve electrochemical energy storage including development of long-life electrodes. Completed materials for high frequency passive microwave components for reduced size and lightweight application to air vehicles. Explored concepts for multifunctional and conformal RF passive	18.810	22.109	21.462	-	21.462

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total
components for air vehicles. Explored metamaterials options for electro-optic/infrared (EO/IR) applications. Explored metamaterials for high frequency RF passive microwave applications. ***FY 2011 Plans:*** Complete development of material concepts for adaptive and multifunctional aircraft structures. Validated and demonstrated materials and process low-cost processing methodologies for photovoltaics for RPA applications. Investigate new materials systems and nano geometries to improve electrochemical energy storage including development of long-life electrodes. Advance concepts for RF passive metamaterials-based components. Explore RF/IR photonics for compact air vehicle applications. Develop fabrication and characterization for EO/IR metamaterials. Develop fabrication and characterization for emerging metamaterial applications. ***FY 2012 Base Plans:*** Continue to investigate new materials systems and nano geometries to improve electrochemical energy storage including development of long-life electrodes. Accelerate applications development for optical metamaterials. Continue to investigate concepts for RF passive metamaterials-based components. Continue to develop RF/IR photonics for compact air vehicle applications. Continue to develop fabrication and characterization for EO/IR metamaterials. Develop fabrication and characterization for emerging metamaterial applications. ***FY 2012 OCO Plans:***					
Title: Major Thrust 3 ***Description:*** Develop lightweight metallic/inter-metallic high temperature materials, life prediction, and metals processing technologies for sustainment issues such as lower costs, increased durability, and improved reliability ***FY 2010 Accomplishments:*** Initiated developmemt of an advanced disk system concept, advanced materials/processes, materials modeling, and propulsion. Demonstrated processing for thin gage metallics and fabrication of honeycomb and sandwich parts. Validated panel analysis methodolgy. Developed quantitative models linking microstructure with thermal and phsyical properties for metallic in high temperature environments. ***FY 2011 Plans:*** Continue development of an advanced disk system concept for insertion into advanced propulsion concepts for air platforms. Continue development of advanced computation methods to support modeling of materials	15.441	13.903	13.442	-	13.442

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total
for advanced propulsion systems. Continue development and demonstration of lightweight metallic thermal protection systems. Optimize fabrication methods for hybrid composite material systems. Continue development and validation of quantitative, predictive models for performance of metallic-based thermal management systems. ***FY 2012 Base Plans:*** Continue development of advanced blade and disk system concept for insertion into advanced propulsion concepts for air platforms. Continue development of advanced computation methods to support material development and characterization modeling for advanced aerospace systems. Continue development and validation of quantitative, predictive models for performance of metallic-based thermal management systems. Determine relationships between microstructure, processing, and the functional properties and performance of metallic, hybrid, nano, and composite materials. ***FY 2012 OCO Plans:***					
Title: Major Thrust 4 ***Description:*** Develop organic matrix composite, hybrid and mulfunctional materials carbon-carbon composite technologies for systems requiring structural management for environmental control. ***FY 2010 Accomplishments:*** Demonstrated new materials for space and high-speed vehicle applications. Completed development of advanced materials concepts and processes to address weapon and air vehicle platforms. Explored composite/hybrid life prediction tools and advanced composite/hybrid materials for engine and airframe applications. Explored novel high-performance coolants, thermoelectric materials, and multiscale predictive tools for thermal management. Integrated ceramic and metallic thermal protection systems (TPS) subcomponents and evaluated in a relevant space environment. ***FY 2011 Plans:*** Continue to demonstrate new materials for space and high-speed vehicle applications. Continue to explore composite/hybrid life prediction tools and advanced composite/hybrid materials for engine and airframe applications. Continue to explore novel high-performance coolants, thermoelectric materials, and multiscale predictive tools for thermal management. Continue to integrate ceramic and metallic TPS subcomponents and evaluated in a relevant space environment. ***FY 2012 Base Plans:***	16.074	15.905	15.309	-	15.309

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total
Continue to demonstrate improved performance of new material systems for space and supersonic/hypersonic vehicle applications. Continue to develop lightweight, active, adaptive, multifunctional, high temperature, and durable composite and hybrid materials for extreme environments including hypersonic applications. Evaluate advanced carbon fibers modified by carbon nanotubes. Develop tailorable/adaptive high performance thermal interfaces, coolants, thermoelectric, and energy storage materials and models for air, space, propulsion, and directed energy applications. Initiate development of novel materials and processes for improved thermal transport, storage, and thermal management for Air Force applications. Continue to transition high-performance material systems for space and high-speed vehicle applications. Develop composite and hybrid life prediction tools for engine and airframe applications. ***FY 2012 OCO Plans:***					
Title: Major Thrust 5 ***Description:*** Develop materials for power, fluids, lubricants, aircraft topcoat, and corrosion resistant coatings using alternative energy and bio-inspired concepts. ***FY 2010 Accomplishments:*** Initiated effort to develop combined thermal/friction coating materials for extreme environments. Developed alternative/renewable energy materials and technologies for Air Force deployed applications, including biomass and other alternative energy solutions. ***FY 2011 Plans:*** Continue to develop combined thermal/friction coating materials for extreme environments. Analyze integration and continue development of alternative/renewable material and technologies for agile and adaptive deployed applications. ***FY 2012 Base Plans:*** Continue development of alternative/renewable energy materials and technologies for deployed applications, including biomass and other alternative energy solutions. Continue to develop combined thermal/friction coating materials for extreme environments. ***FY 2012 OCO Plans:***	3.492	2.950	2.688	-	2.688
Title: Major Thrust 6	14.364	14.199	13.732	-	13.732

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total
Description: Develop the basic nanomaterial building blocks for munitions and propulsion energetic systems. Develop fundamental Science and Technology for pervasive device processing mechanisms via bio-inspired concepts and at the nanoscale level. ***FY 2010 Accomplishments:*** Demonstrated large-scale synthesis and characterization techniques for energetic nanomaterials to provide stable, triggerable, nanoscale energetic materials for enhanced energy release munitions, high efficiency air-breathing propulsion, and access to space. Validated the transport and compartmentalization of nanoparticles being investigated as nanoenergetics to evaluate potential environmental impact. Analyzed microstructural characterization tools to provide robust processing-performance correlations of nanoenergetic systems. Developed multi-component, structured nanoparticle catalyses as controlled release agents for enhancing stability and storage, as well as providing enhanced ignition. Downselected most promising biological/ nanomaterial hybrids for the detection and identification of threat agents. ***FY 2011 Plans:*** Demonstrate nanomaterials that provide stable, triggerable, nanoscale energetic materials for enhanced energy release munitions, high efficiency air-breathing propulsion, and access to space. Develop understanding of rapid propulsion methods for nano bio-material devices for aircraft and space structures, actuators, sensors, and electronics. Demonstrate the transport and compartmentalization of nanoparticles being investigated as nanoenergetics to evaluate potential environmental impact. Validate microstructural characterization tools to provide robust processing-performance correlations of nanoenergetic systems. ***FY 2012 Base Plans:*** Demonstrate and validate nanomaterials. for structural nano-energetic (SNE) materials for enhanced energy release munitions, high efficiency air-breathing propulsion, and access to space. Develop biological engineering methods to facilitate the generation of sensors, materials, and electro-optic devices for production of complext hybrid materials. Investigate the confluence on nano-materials and bio-materials focusing on transitioning mechanical optical or electronic devices based upon nano-materials and bio-materials. ***FY 2012 OCO Plans:***					
Title: Major Thrust 7 ***Description:*** Develop high temperature materials, structures, and thermal management concepts to enable furture defense capabilities for prompt global strike concepts.	1.977	2.726	2.652	-	2.652

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total
FY 2010 Accomplishments: Investigated advanced ceramics, ceramic matrix composites, hybrids, and metallic concepts for hot structure and thermal protection systems. ***FY 2011 Plans:*** Continue to investigate advanced ceramics, ceramic matrix composites, hybrids, and metallic concepts for hot structure and thermal protection systems. ***FY 2012 Base Plans:*** Develop advanced ceramics, ceramic matrix composites, hybrids, and metallic concepts for reuseable hot structure and thermal protection systems. ***FY 2012 OCO Plans:***					
Accomplishments/Planned Programs Subtotals	81.374	84.865	81.915	-	81.915

	FY 2010	FY 2011
Congressional Add: Air Force Minority Program ***FY 2010 Accomplishments:*** Conduct Congressionally-directed effort. ***FY 2011 Plans:***	4.780	-
Congressional Add: Carbon Nanomaterials for Advanced Aerospace Applications ***FY 2010 Accomplishments:*** Conduct Congressionally-directed effort. ***FY 2011 Plans:***	0.797	-
Congressional Add: ONAMI Safer Nanomaterials and Nanomanufacturing ***FY 2010 Accomplishments:*** Conduct Congressionally-directed effort. ***FY 2011 Plans:***	3.505	-
Congressional Add: Consortium for Nanomaterials for Aerospace Commerce and Technology (CONTACT) ***FY 2010 Accomplishments:*** Conduct Congressionally-directed effort. ***FY 2011 Plans:***	3.187	-
Congressional Add: Advanced Aerospace Carbon Foam Heat Exchanges	3.187	-

Exhibit R-2A, RDT&E Project Justification: PB 2012 Air Force		DATE: February 2011
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	FY 2010	FY 2011
FY 2010 Accomplishments: Conduct Congressionally-directed effort. ***FY 2011 Plans:***		
Congressional Add: Institute for Science and Engineering Simulation/Aircraft Fatigue Modeling and Simulation ***FY 2010 Accomplishments:*** Conduct Congressionally-directed effort. ***FY 2011 Plans:***	3.585	-
Congressional Add: Development of Mobile Wind Turbine Systems to Power Forward Bases ***FY 2010 Accomplishments:*** Conduct Congressionally-directed effort. ***FY 2011 Plans:***	1.195	-
Congressional Add: Aerospace Laser Micro Engineering Station ***FY 2010 Accomplishments:*** Conduct Congressionally-directed effort. ***FY 2011 Plans:***	0.797	-
Congressional Add: Hybrid Nanoparticle-based Coolant Technology Development and Manufacturing ***FY 2010 Accomplishments:*** Conduct Congressionally-directed effort. ***FY 2011 Plans:***	0.797	-
Congressional Add: Lightning Protection Composites ***FY 2010 Accomplishments:*** Conduct Congressionally-directed effort. ***FY 2011 Plans:***	2.987	-
Congressional Add: Ultra-high Temperature Materials for Hypersonic Aerospace Vehicles ***FY 2010 Accomplishments:*** Conduct Congressionally-directed effort. ***FY 2011 Plans:***	2.390	-
Congressional Add: Pennsylvania Nanomaterials Commericialization Center ***FY 2010 Accomplishments:*** Conduct Congressionally directed effort. ***FY 2011 Plans:***	0.797	-
Congressional Adds Subtotals	28.004	-

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C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total	FY 2013	FY 2014	FY 2015	FY 2016	Cost To Complete	Total Cost
• Activity Not Provided: *Title Not Provided*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

D. Acquisition Strategy

Not Applicable.

E. Performance Metrics

Please refer to the Performance Base Budget Overview Book for information on how Air Force resources are applied and how those resources are contributing to Air Force performance goals and most importantly, how they contribute to our mission.

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COST ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total	FY 2013	FY 2014	FY 2015	FY 2016	Cost To Complete	Total Cost
624348: *Materials for Electronics, Optics, and Survivability*	33.109	31.687	30.421	-	30.421	30.442	30.566	30.846	31.415	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project develops materials technologies for surveillance and situational awareness systems and subsystems for aircraft and missile applications, including sensor, microwave, and infrared detection and countermeasures devices used for targeting, electronic warfare, and active aircraft protection. Materials for protection of aircrews, sensors, and aircraft from laser and high-power microwave directed energy threats are also developed. Electronic and optical materials are being developed to enable surveillance and situational awareness with faster operating speeds, greater tunability, higher power output, improved thermal management (including higher operating temperatures), greater sensitivity, and extended dynamic range. New materials are being developed to counter the most prominent laser threats and to respond to emerging and agile threat wavelengths without impairing mission effectiveness.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total
Title: Major Thrust 1	8.040	8.665	8.295	-	8.295
Description: Develop IR detector and hybrid materials, Materials and Processes (M&P) technologies for performance, affordability, and operational capability of surveillance, tracking, targeting, and situational awareness systems. ***FY 2010 Accomplishments:*** Increased yield of full wafer focal plane arrays of 2k x 2k and developed multifunction readout integrated circuit. Investigated alternative Infra-Red (IR) materials for long wavelength detection. Pursued emerging IR materials in the short wave regime for day-night operation. Modeled and evaluated optical behavior of materials for low observable (LO), intelligence, surveillance, and reconnaissance (ISR), and other applications. Investigated materials constructs for multi-wavelength detection. Explored single material, multi-wavelength materials schemes. Extended capability of three-dimensional detection to multiple bands and explore tailoring options for diverse mission requirements. Advanced and refined growth technology for nano-scale IR detection. Explored options for novel nano-scale detection. Scaled up growth technology for nano-scale IR. Advance novel nano- scale materials options. ***FY 2011 Plans:*** Optimize 2k x 2k detector and readout integrated circuit design, processing, and packaging for enhanced focal plane array yields.					

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total
Further IR materials development for long wavelength. Advance mid wavelength materials development for high temperature, low-noise operation for use on low-power systems. Model and evaluate optical behavior of materials for LO, ISR, and other applications. Explore enhancing detection capability of three-dimensional detection. Investigate next generation alternative three-dimension schemes. Scale up growth technology for nano-scale IR. Advance novel nano-scale materials options. Continue to model and evaluate materials optical/ IR behavior for LO, ISR, and other applications. ***FY 2012 Base Plans:*** Demonstrate reproducibility of optimized 2k x 2k detector and readout integrated circuit design, processing, and packaging for enhanced focal plane array yields. Develop a superlattice based material system for use in the detector elements of very long wavelength IR detector focal plane arrays. Continue to advance mid wavelength materials development for high temperature, low-noise operation for use on low-power systems. Validate models of materials optical/IR behavior for LO, ISR, and other applications. Initiate development of materials for nano-scale detection. ***FY 2012 OCO Plans:***					
Title: Major Thrust 2 ***Description:*** Develop and demonstrate technologies to enhance the safety, survivability, and mission effectiveness of aircrews, sensors, viewing systems, and related assets. ***FY 2010 Accomplishments:*** Developed nonlinear optical limiter solid state materials into device concepts for damage protection of space-based sensor systems. Investigated photorefractive materials growth repeatability for increased probability of technology transition to Air Force passive protection applications. Demonstrated electrically tunable liquid crystal filters for sensor system protection concepts. Developed thin film concepts for enhanced fixed filter performance. Developed and analyzed electromagnetic interference and high power microwave shielding for electronics hardening. ***FY 2011 Plans:*** Demonstrate optimized nonlinear optical limiter materials for damage protection. Demonstrate enhanced photorefractive hybrid materials concepts for Air Force passive protection applications. Mature improved liquid crystal materials for photo-tunable devices for sensor system protection concepts. Demonstrate thin film	5.828	9.115	8.730	-	8.730

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total
growth capabilities for enhanced fixed filter performance. Demonstrate semiconductor optical limiter materials performance for damage protection in the short wave infrared. ***FY 2012 Base Plans:*** Continue demonstration of optimized nonlinear optical limiter materials for damage protection. Continue to develop new optical limiter materials and material technologies for robust in-band protection. Continue demonstration of enhanced photorefractive hybrid materials concepts for Air Force passive protection applications. Develop tunable/switchable materials and concepts to provide jamming protection to a variety of systems. Develop and demonstrate passive optical coating technology for advanced applications in airborne, space, and personnel systems. ***FY 2012 OCO Plans:***					
Title: Major Thrust 3 ***Description:*** Develop M&P technologies for power generation and control, and microwave components for surveillance, tracking, targeting, situational awareness, and lethal and non-lethal systems. ***FY 2010 Accomplishments:*** Explored and identified materials-to-materials interactions responsible for reduced reliability. Refined thin film growth process for improved wide bandgap semiconductor material. Investigated performance issues in materials components of high power microwave directed energy weapons. Developed nanostructured materials using multiple approaches for high energy density capacitors for pulsed power applications. ***FY 2011 Plans:*** Develop materials growth adjustment/mitigation methodologies for improved reliability. Improve materials and materials applications for increased reliability and power for high power microwave directed energy applications. ***FY 2012 Base Plans:*** Develop and validate characterization and modeling tools to analyze material changes that occur at the nanoscale within an operating device.	5.229	5.830	5.610	-	5.610

Exhibit R-2A, RDT&E Project Justification: PB 2012 Air Force		DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 3600: *Research, Development, Test & Evaluation, Air Force* BA 2: *Applied Research*	R-1 ITEM NOMENCLATURE PE 0602102F: *Materials*	PROJECT 624348: *Materials for Electronics, Optics, and Survivability*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total
Develop and demonstrate reliable materials and processes to optimize components for compact, lightweight, high power microwave directed energy applications. Continue to develop nanostructured materials using multiple approaches for high energy density capacitors for pulsed power applications. ***FY 2012 OCO Plans:***					
Title: Major Thrust 4 ***Description:*** Develop enabling and foundational biotechnologies for guidance and control, rapid tagging, tracking, and identification of targets, and bio-integrated electronics and sensing. ***FY 2010 Accomplishments:*** Validated efficacy of using taggants for preemptive destruction of threat agents. Incorporated taggants into a variety of media (polymer, paints) for optimal and mission-specific dispersal. Modeled dispersion properties of polymer-encapsulated taggants for optimal release and coverage. ***FY 2011 Plans:*** Develop new bio-materials and nano-materials that enable broad spectrum mitigation of environmental threats. Integrate delivery methods and bio-materials and nano-materials appropriate for specific Air Force requirements. Demonstrate materials with specific performance characteristic. ***FY 2012 Base Plans:*** Develop bio-materials and nano-based and functionalized materials for tagging, tracking, and locating applications. Develop biological engineering methods for sensors and electro-optic devices for complex hybrid materials. Develop bio-materials and nano-materials that enable broad spectrum mitigation of environmental threats. ***FY 2012 OCO Plans:***	4.843	4.970	4.730	-	4.730
Title: Major Thrust 5 ***Description:*** Develop materials enabling higher performance lasing media, new laser architectures, optical isolators, beam steering, and other high energy laser components for directed energy. ***FY 2010 Accomplishments:*** Investigated host/dopant materials for fiber lasers in the eye-safe regime.	2.398	3.107	3.056	-	3.056

Exhibit R-2A, RDT&E Project Justification: PB 2012 Air Force		DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 3600: *Research, Development, Test & Evaluation, Air Force* BA 2: *Applied Research*	R-1 ITEM NOMENCLATURE PE 0602102F: *Materials*	PROJECT 624348: *Materials for Electronics, Optics, and Survivability*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total
Demonstrate preliminary fiber development. Demonstrated solid state, very high-speed beam steering materials options. Investigated very high-speed beam steering configurations. Explored options and developed alternate materials and processes for high energy lasers. ***FY 2011 Plans:*** Pursue materials for enabling improved laser source components operating in the mid-infrared range. Improve very high-speed beam steering materials and pursue most promising beam steering configurations. Improve materials to increase high energy laser efficiency and gain. ***FY 2012 Base Plans:*** Develop materials for enabling improved laser source components operating in the mid-infrared range. Continue to develop materials processes for fabricating new laser beam scanning architectures that utilize the latest generation of EO polymers to enable the high-speed beam steering. Develop and demonstrate materials that increase high energy laser efficiency and gain. ***FY 2012 OCO Plans:***					
Accomplishments/Planned Programs Subtotals	26.338	31.687	30.421	-	30.421

	FY 2010	FY 2011
Congressional Add: Large Area, APTV Materials Development for High Power Devices ***FY 2010 Accomplishments:*** Conduct Congressionally directed effort. ***FY 2011 Plans:***	1.593	-
Congressional Add: Mid-IR Laser Materials ***FY 2010 Accomplishments:*** Conduct Congressionally directed effort. ***FY 2011 Plans:***	0.797	-
Congressional Add: Low-Defect Density Gallium Nitride Materials for High-Performance Electronics Devices ***FY 2010 Accomplishments:*** Conduct Congressionally directed effort. ***FY 2011 Plans:***	2.788	-
Congressional Add: Gallium Nitride (GaN) Microelectronics and Materials	1.593	-

Exhibit R-2A, RDT&E Project Justification: PB 2012 Air Force		DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 3600: *Research, Development, Test & Evaluation, Air Force* BA 2: *Applied Research*	**R-1 ITEM NOMENCLATURE** PE 0602102F: *Materials*	**PROJECT** 624348: *Materials for Electronics, Optics, and Survivability*

	FY 2010	FY 2011
FY 2010 Accomplishments: Conduct Congressionally-directed effort.		
FY 2011 Plans:		
Congressional Adds Subtotals	6.771	-

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total	FY 2013	FY 2014	FY 2015	FY 2016	Cost To Complete	Total Cost
• Activity Not Provided: *Title Not Provided*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

D. Acquisition Strategy

Not Applicable.

E. Performance Metrics

Please refer to the Performance Base Budget Overview Book for information on how Air Force resources are applied and how those resources are contributing to Air Force performance goals and most importantly, how they contribute to our mission.

Exhibit R-2A, RDT&E Project Justification: PB 2012 Air Force			DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 3600: *Research, Development, Test & Evaluation, Air Force* BA 2: *Applied Research*	R-1 ITEM NOMENCLATURE PE 0602102F: *Materials*	PROJECT 624349: *Materials Technology for Sustainment*	

COST ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total	FY 2013	FY 2014	FY 2015	FY 2016	Cost To Complete	Total Cost
624349: *Materials Technology for Sustainment*	22.361	16.893	20.052	-	20.052	20.158	19.998	22.341	22.744	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project develops materials and materials processing technologies to support operational Air Force mission areas by providing the ability to inspect the quality of delivered systems, transitioning more reliable and maintainable materials, establishing a capability to detect and characterize performance threatening defects, characterizing materials processes and properties necessary for materials transition, and providing quick reaction support and failure analysis to the operational commands and repair centers. Repair techniques and nondestructive inspection/evaluation (NDI/E) methods are developed that are needed for metallic and non-metallic structures, coatings, corrosion control processes, and to support integration of composite structures for aerospace systems. Various NDI/E methods are essential to ensure optimum quality in the design and production of aircraft, propulsion, and missile systems. These NDI/E methods are also essential to monitor and detect the onset of any service-initiated damage and/or deterioration due to aging of operational systems.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total
Title: Major Thrust 1	2.941	5.079	7.153	-	7.153
Description: Develop sensing and life prediction technologies to identify damage and characterize the health of aging structures, propulsion systems, and low-observable (LO) materials and structures. ***FY 2010 Accomplishments:*** Developed advanced novel sensing techniques to detect and track corrosion and other damage to materials in aerospace systems. Demonstrated multi-layer sensing capabilities to demonstrate applications and damage models for a wide variety of aerospace structures. Developed advanced sensing technologies that detect changes in material properties from corrosion and in-field use, damage evolution, and other factors that detrimentally affect aerospace systems. Develop and validate affordable prognosis approaches for life cycle sustainment and management and for life extension capability. Demonstrate novel LO point inspection probes to enable rapid assessment of LO material performance. Investigate next generation LO point inspection needs. ***FY 2011 Plans:*** Demonstrate advanced novel sensing techniques to detect and track corrosion and other damage to materials in aerospace systems. Demonstrate augmented multi-layer sensing capabilities to demonstrate applications and damage models for a wide variety of aerospace structures. Demonstrate sensing technologies that detect changes in material properties from corrosion and in-field use, damage evolution, and other factors that detrimentally affect aerospace systems. Develop and validate affordable prognosis approaches for life cycle					

Exhibit R-2A, RDT&E Project Justification: PB 2012 Air Force		DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 3600: *Research, Development, Test & Evaluation, Air Force* BA 2: *Applied Research*	R-1 ITEM NOMENCLATURE PE 0602102F: *Materials*	PROJECT 624349: *Materials Technology for Sustainment*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total
sustainment and management and for life extension capability. Demonstrate novel LO point inspection probes to enable rapid assessment of LO material performance. Investigate next generation LO point inspection needs. ***FY 2012 Base Plans:*** Advance novel sensing modeling, methods, and techniques to detect and track damage to other materials and components for aerospace systems. Conduct applied research to enhance sensing through multiple layers of skin and structures to improve the probabilities of finding deeply imbedded or hidden damage in aerospace systems. Advance sensing technologies that detect changes in material properties, damage evolution, and other factors that detrimentally affect aerospace systems. Develop and improve affordable prognosis approaches for life cycle management and life extension capability for aerospace structure and turbine engines. Investigate and augment innovative LO point inspection probes to enable rapid assessment of LO material performance. ***FY 2012 OCO Plans:***					
Title: Major Thrust 2 ***Description:*** Develop support capabilities, information, and processes to resolve problems with materials in the production and repair of systems components and structures. ***FY 2010 Accomplishments:*** Evaluated advanced materials and processes technologies to repair Air Force legacy systems and test failure limits for emerging Air Force systems. Developed and demonstrated test methods and techniques to understand the effects of in-service environments and materials processes, such as the application of residual stress on the surface of steel and other structural metals, to support studies and point design solutions that will extend the life of specific structural components on Air Force systems. Demonstrated and transitioned technologies for improved maintainability and life cycle cost of advanced LO materials and designs, such as conductive outer-mold-line, applique, door edges and seals, and multifunctional systems. Developed and demonstrated laboratory test methods to evaluate and characterize candidate space materials for properties and material behavior suitable for use in space applications. ***FY 2011 Plans:*** Evaluate advanced materials and processes technology to repair Air Force legacy systems and test failure limits for emerging Air Force systems. Develop and demonstrate test methods and techniques to understand the effects of in-service environments and materials processes, such as the application of residual stress on the surface of steel and other structural	4.827	5.140	6.053	-	6.053

Exhibit R-2A, RDT&E Project Justification: PB 2012 Air Force		DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 3600: *Research, Development, Test & Evaluation, Air Force* BA 2: *Applied Research*	R-1 ITEM NOMENCLATURE PE 0602102F: *Materials*	PROJECT 624349: *Materials Technology for Sustainment*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total
metals, to support studies and point design solutions that will extend the life of specific structural components on Air Force systems. Demonstrate and transition technologies for improved maintainability and life cycle cost of advanced materials and designs, such as conductive outer-mold-line, films, coatings, access panel treatments and multifunctional systems. Develop and demonstrate laboratory test methods to evaluate and characterize candidate space materials for properties and material behavior suitable for use in space applications. ***FY 2012 Base Plans:*** Evaluate advanced materials and processes technology to repair Air Force legacy systems and test failure limits for emerging Air Force systems. Develop and demonstrate test methods and techniques to understand the effects of in-service environments, residual stress and materials processes on structural materials, and to support studies and point design solutions that will extend the life of specific structural components on Air Force systems. Demonstrate and transition technologies for improved maintainability and life cycle cost of advanced materials and designs, such as conductive outer-mold-line, aircraft films, coatings, access panel treatments and multifunctional systems. Develop and demonstrate laboratory test methods to evaluate and characterize candidate space materials for properties and material behavior suitable for use in space applications. ***FY 2012 OCO Plans:***					
Title: Major Thrust 3 ***Description:*** Develop support capabilities, information, and processes to resolve materials problems and provide electronic and structural failure analysis of components. ***FY 2010 Accomplishments:*** Performed quick response failure analysis and materials investigations for fielded system, acquisition organization, depot system materials failures, and provided advanced materials solutions to ensure system availability and safety of flight. Developed advanced electrostatic discharge protection technologies and procedures for emerging avionics subsystems. Demonstrated advanced test methodologies for analyzing structural failures of emerging materials for Air Force systems. Developed advanced wiring materials technologies to replace aging wiring systems and new wiring technologies for emerging weapon systems. ***FY 2011 Plans:***	6.148	6.674	6.846	-	6.846

Exhibit R-2A, RDT&E Project Justification: PB 2012 Air Force		DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 3600: *Research, Development, Test & Evaluation, Air Force* BA 2: *Applied Research*	R-1 ITEM NOMENCLATURE PE 0602102F: *Materials*	PROJECT 624349: *Materials Technology for Sustainment*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total
Perform quick response failure analysis and materials investigations for fielded system, acquisition organization, depot system materials failures, and provide advanced materials solutions to ensure system availability and safety of flight. Develop advanced electrostatic discharge protection technologies and procedures for emerging avionics subsystems. Demonstrate advanced test methodologies for analyzing structural failures of emerging materials for Air Force systems. Develop advanced wiring materials technologies to replace aging wiring systems and new wiring technologies for emerging weapon systems. ***FY 2012 Base Plans:*** Perform quick response failure analysis and materials investigations. Provide advanced materials solutions to ensure system availability and safety of flight. Initiate development of Microelectromechanical System (MEMS) failure analysis capabilities. Develop advanced electrostatic discharge protection technologies and procedures for emerging avionics subsystems. Demonstrate advanced test methodologies for analyzing electrical and structural failures of emerging materials. Develop and demonstrate advanced wiring materials technologies to replace aging wiring systems and new wiring technologies for emerging weapon systems. ***FY 2012 OCO Plans:***					
Accomplishments/Planned Programs Subtotals	13.916	16.893	20.052	-	20.052

	FY 2010	FY 2011
Congressional Add: Accelerated Insertion of Advanced Materials and Certification for Military Aircraft Structure Materials Substitution and Repair ***FY 2010 Accomplishments:*** Conduct Congressionally-directed effort. ***FY 2011 Plans:***	1.992	-
Congressional Add: Conducting Polymer Stress and Polymer Damage Sensors for Composites ***FY 2010 Accomplishments:*** Conduct Congressionally-directed effort. ***FY 2011 Plans:***	2.868	-
Congressional Add: LGX High Temperature Acoustic Wave Sensors	1.593	-

Exhibit R-2A, RDT&E Project Justification: PB 2012 Air Force		DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 3600: *Research, Development, Test & Evaluation, Air Force* BA 2: *Applied Research*	**R-1 ITEM NOMENCLATURE** PE 0602102F: *Materials*	**PROJECT** 624349: *Materials Technology for Sustainment*

	FY 2010	FY 2011
FY 2010 Accomplishments: Conduct Congressionally-directed effort. ***FY 2011 Plans:***		
Congressional Add: Hybrid Materials Integration (HMI) ***FY 2010 Accomplishments:*** Conducted Congressionally-directed effort. ***FY 2011 Plans:***	1.992	-
Congressional Adds Subtotals	8.445	-

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total	FY 2013	FY 2014	FY 2015	FY 2016	Cost To Complete	Total Cost
• Activity Not Provided: *Title Not Provided*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

D. Acquisition Strategy

Not Applicable.

E. Performance Metrics

Please refer to the Performance Base Budget Overview Book for information on how Air Force resources are applied and how those resources are contributing to Air Force performance goals and most importantly, how they contribute to our mission.

Exhibit R-2A, RDT&E Project Justification: PB 2012 Air Force			DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 3600: *Research, Development, Test & Evaluation, Air Force* BA 2: *Applied Research*	R-1 ITEM NOMENCLATURE PE 0602102F: *Materials*	PROJECT 624915: *Deployed Air Base Technology*	

COST ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total	FY 2013	FY 2014	FY 2015	FY 2016	Cost To Complete	Total Cost
624915: *Deployed Air Base Technology*	12.390	3.828	3.842	-	3.842	3.892	4.000	4.142	4.228	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project develops new deployable airbase technologies to reduce airlift and manpower requirements, setup times, and sustainment costs, and to improve protection and survivability of deployed Air Expeditionary Force (AEF) warfighters. Affordable, efficient technologies are developed for base infrastructure, fire fighting, and force protection to improve Expeditionary Combat Support operations.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total
Title: Major Thrust 1	2.110	1.911	1.974	-	1.974
Description: Develop deployable infrastructure airbase technologies to reduce airlift and manpower requirements, setup times, and sustainment costs in support of AEF operations. ***FY 2010 Accomplishments:*** Developed deployable applications of higher efficiency collection and conversion of solar power for deployed applications. Analyzed performance of candidate high temperature aircraft operating surface materials. Developed remote non-destructive inspection of airfield surface evaluation technologies. ***FY 2011 Plans:*** Develop and demonstrate deployable applications of higher efficiency collection and conversion of solar power for deployed applications. Develop and optimize performance of candidate high temperature operating surface materials. Develop and improve remote and autonomous non-destructive inspection of airfield surface evaluation technologies ***FY 2012 Base Plans:*** Investigate and develop innovative airbase alternative energy generation capability, power grid conditioning, and distribution methods. Explore and continue development of innovative high operating temperature materials and technologies for aircraft operating surfaces. ***FY 2012 OCO Plans:***					
Title: Major Thrust 2	1.715	1.917	1.868	-	1.868

Exhibit R-2A, RDT&E Project Justification: PB 2012 Air Force		DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 3600: *Research, Development, Test & Evaluation, Air Force* BA 2: *Applied Research*	R-1 ITEM NOMENCLATURE PE 0602102F: *Materials*	PROJECT 624915: *Deployed Air Base Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total
Description: Develop affordable technologies to provide force protection and survivability to AEF deployed warfighters and infrastructure. ***FY 2010 Accomplishments:*** Analyzed fire suppression agents using methodologies supporting deployed warfighters and infrastructure. Investigated novel, cost-effective technologies for fire fighter effectiveness and optimized developed technologies. Investigated novel structural materials and technologies to support deployed warfighters and infrastructure, using methodologies developed for protection. Analyzed and conducted experiments to verify effectiveness for defeat of Improvised Explosive Device (IED) and high energy threat technologies. Transitioned mature defeat technologies and investigated emerging threats. Explored functions of microbes and developed effective methodologies to capture biological processes for use in Air Force applications. ***FY 2011 Plans:*** Develop and optimize fire suppression agents using methodologies supporting deployed warfighters and infrastructure. Develop novel cost- effective technologies for fire fighter effectiveness in deployed environments. Develop novel structural materials and technologies to support deployed warfighters and infrastructure using methodologies developed for protection from emerging threats. Develop and optimize techniques and materials for defeat of new and evolving IED and high energy threats. Analyze functions of microbes and develop effective methodologies to capture biological processes for use in Air Force applications, such as sensing and development of solid state materials. Evaluate design and performance of microbial-based technologies. ***FY 2012 Base Plans:*** Develop technologies for airbase structural protection against blast and fragmentation. Explore technology to enhance structural integrity. Investigate composite material combustion processes and develop modeling for aircraft fires. Develop innovatve technologies for airbase firefighting. ***FY 2012 OCO Plans:***					
Accomplishments/Planned Programs Subtotals	3.825	3.828	3.842	-	3.842

	FY 2010	FY 2011
Congressional Add: Fire and Blast Resistant Materials for Force Protection	3.187	-

Exhibit R-2A, RDT&E Project Justification: PB 2012 Air Force		DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 3600: *Research, Development, Test & Evaluation, Air Force* BA 2: *Applied Research*	**R-1 ITEM NOMENCLATURE** PE 0602102F: *Materials*	**PROJECT** 624915: *Deployed Air Base Technology*

	FY 2010	FY 2011
FY 2010 Accomplishments: Conduct Congressionally directed effort. ***FY 2011 Plans:***		
Congressional Add: Energy Efficiency, Recovery, and Generation (ENERGy) ***FY 2010 Accomplishments:*** Conduct Congressionally-directed effort. ***FY 2011 Plans:***	0.996	-
Congressional Add: Fine Water Mist Fire Suppression Technology to Replace Halon ***FY 2010 Accomplishments:*** Conduct Congressionally-directed effort. ***FY 2011 Plans:***	1.992	-
Congressional Add: Partnership for Energy and Automation Technologies ***FY 2010 Accomplishments:*** Conduct Congressionally-directed effort. ***FY 2011 Plans:***	1.593	-
Congressional Add: Temperature Resistant Landing Pad Jet Blast Protection ***FY 2010 Accomplishments:*** Conduct Congressionally-directed effort. ***FY 2011 Plans:***	0.797	-
Congressional Adds Subtotals	8.565	-

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total	FY 2013	FY 2014	FY 2015	FY 2016	Cost To Complete	Total Cost
• Activity Not Provided: *Title Not Provided*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

D. Acquisition Strategy

Not Applicable.

E. Performance Metrics

Please refer to the Performance Base Budget Overview Book for information on how Air Force resources are applied and how those resources are contributing to Air Force performance goals and most importantly, how they contribute to our mission.