

**Statement of Work**

<b>Item</b>	<b>Description</b>	<b>Applicable Contract Function</b>						
<b>1</b>	<b>Flight Project Thermal Coatings Selection, Review, and Recommendation</b>	<b>Implementation Phase Services – Mechanical Systems Disciplines</b>						
	<table border="1"> <thead> <tr> <th>Performance Requirements</th> <th>Delivery Schedule:</th> </tr> </thead> <tbody> <tr> <td>                     Establishment of subtask organization to support flight project efforts according to the following order. Subsequent subtasks will be added to the project to support future work. Subtask 101 Small Projects Subtask 102 Coatings Committee Subtask 103 NICER Subtask 104 LCRD Subtask 105 Solar Probe Plus MAG Subtask 106 Solar Probe Plus Spacecraft Subtask 107 Solar Probe Plus WISPR Subtask 108 GEDI Subtask 109 GOLD, Subtask 110 OSIRIS-REx, Subtask 111 SPP FIELDS, Subtask 112 SPP SWEAP, Subtask 113 WFIRST Detector development, Subtask 114 SOLO-Hi, Subtask 115 XARM, Subtask 116 Europa Clipper, Subtask 117 ARCSTONE, and any additional subtask required to support programs as directed by TM                 </td> <td>12 Month(s)</td> </tr> <tr> <td>                     Review, select and recommend thermal control coatings and materials for space application to address program or instrument needs. Provide support to and participate in meeting of the GSFC Coatings Committee, as needed. Assist with the determination of beginning-of-life (BOL) and end-of-life (EOL) thermal radiative property predictions of thermal control coatings and surfaces based on specified mission parameters, laboratory testing and space flight data. Participate in discipline (thermal, contamination, and mechanical) peer reviews and project design reviews. Participate in all design, I&amp;T, and subcontractor meetings to support selection, review and recommendation                 </td> <td>12 Month(s)</td> </tr> </tbody> </table>	Performance Requirements	Delivery Schedule:	Establishment of subtask organization to support flight project efforts according to the following order. Subsequent subtasks will be added to the project to support future work. Subtask 101 Small Projects Subtask 102 Coatings Committee Subtask 103 NICER Subtask 104 LCRD Subtask 105 Solar Probe Plus MAG Subtask 106 Solar Probe Plus Spacecraft Subtask 107 Solar Probe Plus WISPR Subtask 108 GEDI Subtask 109 GOLD, Subtask 110 OSIRIS-REx, Subtask 111 SPP FIELDS, Subtask 112 SPP SWEAP, Subtask 113 WFIRST Detector development, Subtask 114 SOLO-Hi, Subtask 115 XARM, Subtask 116 Europa Clipper, Subtask 117 ARCSTONE, and any additional subtask required to support programs as directed by TM	12 Month(s)	Review, select and recommend thermal control coatings and materials for space application to address program or instrument needs. Provide support to and participate in meeting of the GSFC Coatings Committee, as needed. Assist with the determination of beginning-of-life (BOL) and end-of-life (EOL) thermal radiative property predictions of thermal control coatings and surfaces based on specified mission parameters, laboratory testing and space flight data. Participate in discipline (thermal, contamination, and mechanical) peer reviews and project design reviews. Participate in all design, I&T, and subcontractor meetings to support selection, review and recommendation	12 Month(s)	
Performance Requirements	Delivery Schedule:							
Establishment of subtask organization to support flight project efforts according to the following order. Subsequent subtasks will be added to the project to support future work. Subtask 101 Small Projects Subtask 102 Coatings Committee Subtask 103 NICER Subtask 104 LCRD Subtask 105 Solar Probe Plus MAG Subtask 106 Solar Probe Plus Spacecraft Subtask 107 Solar Probe Plus WISPR Subtask 108 GEDI Subtask 109 GOLD, Subtask 110 OSIRIS-REx, Subtask 111 SPP FIELDS, Subtask 112 SPP SWEAP, Subtask 113 WFIRST Detector development, Subtask 114 SOLO-Hi, Subtask 115 XARM, Subtask 116 Europa Clipper, Subtask 117 ARCSTONE, and any additional subtask required to support programs as directed by TM	12 Month(s)							
Review, select and recommend thermal control coatings and materials for space application to address program or instrument needs. Provide support to and participate in meeting of the GSFC Coatings Committee, as needed. Assist with the determination of beginning-of-life (BOL) and end-of-life (EOL) thermal radiative property predictions of thermal control coatings and surfaces based on specified mission parameters, laboratory testing and space flight data. Participate in discipline (thermal, contamination, and mechanical) peer reviews and project design reviews. Participate in all design, I&T, and subcontractor meetings to support selection, review and recommendation	12 Month(s)							
<b>2</b>	<b>Flight Project Thermal Coatings Application, and Development</b>	<b>Implementation Phase Services – Mechanical Systems Disciplines</b>						
	<table border="1"> <thead> <tr> <th>Performance Requirements</th> <th>Delivery Schedule:</th> </tr> </thead> <tbody> <tr> <td>                     Perform thermal coatings, optical, or contamination control coatings application, thin film deposition or cleaning and or removing identified non-conforming items on flight hardware, ETU, and GSE structures in GSFC on-site coatings facilities, utilizing GSFC coatings thermal vacuum systems and spray booths for increased work on flight projects. Perform thermal coatings application and depositions on test coupons and hardware for development of project flight hardware. Perform touch-up and repair of coated flight hardware and surfaces, as requested.                 </td> <td>12 Month(s)</td> </tr> </tbody> </table>	Performance Requirements	Delivery Schedule:	Perform thermal coatings, optical, or contamination control coatings application, thin film deposition or cleaning and or removing identified non-conforming items on flight hardware, ETU, and GSE structures in GSFC on-site coatings facilities, utilizing GSFC coatings thermal vacuum systems and spray booths for increased work on flight projects. Perform thermal coatings application and depositions on test coupons and hardware for development of project flight hardware. Perform touch-up and repair of coated flight hardware and surfaces, as requested.	12 Month(s)			
Performance Requirements	Delivery Schedule:							
Perform thermal coatings, optical, or contamination control coatings application, thin film deposition or cleaning and or removing identified non-conforming items on flight hardware, ETU, and GSE structures in GSFC on-site coatings facilities, utilizing GSFC coatings thermal vacuum systems and spray booths for increased work on flight projects. Perform thermal coatings application and depositions on test coupons and hardware for development of project flight hardware. Perform touch-up and repair of coated flight hardware and surfaces, as requested.	12 Month(s)							

MIST SOW TASK 129

Title: Thermal Coatings Flight Projects

<p>Perform general maintenance to maintain upkeep of the GSFC on-site thermal control coatings application and thin film deposition equipment and facilities (vacuum chambers, spray guns, spray booth, etc.).</p>	
<p>Establish and define material development or qualification plans for new program thermal coating systems or for untested environments of existing heritage materials. Perform all testing as described in SOW items 3 and 4 to establish qualification of materials. Report all findings within 3 weeks of completion of testing. Additionally, provide all test support, GSE and facilities for environmental vacuum bakeout testing of flight coating materials and other hardware in accordance with SOW items 3 and 4 or other established program test plans</p>	<p>12 Month(s)</p>
<p>Review, modify, and revise all documentation pertinent to thermal coatings application and development or environments characterization as needed under direction of the TM. The documents may include but are not limited to the following:</p> <p>Governing GSFC ISO work instruction documents: 546-WI-8072.1.62 -- Procedure for Application of Aeroglaze Z306 and Aeroglaze A276 Thermal Control Coatings                      546-WI-8072.1.63 -- Procedure for Application of Aeroglaze Z307 Coatings                      546-WI-8072.1.64 -- Procedure for Application of Electrodag Coatings to Electric Field Sensors for Use on Sounding Rockets 546-WI-8072.1.65 -- Procedure for Formulation/Application of Glass Balloon Filled Low Specularity Black Paint                      546-WI-8072.1.66 -- Procedure for Formulation/Application to Aluminum, of NSB69E and NSB69-82 Thermal Control Coatings 546-WI-8072.1.67 -- Procedure for Application and Maintenance Metallized Teflon Tape With/Without ITO Topcoat                      546-WI-8072.1.68 -- Procedure for Formulation/Application of MSA94B Black Thermal Control Coating 546-WI-8072.1.70 -- Formulation/Application of Silicate Based Electrically Conductive Thermal Control Coating 546-WI-8072.1.71 -- Procedure for Specification/Application Of Z-93P and AZ93 Thermal Control Coating 546-WI-8072.1.72 -- Procedure for Application of 3M 425 Aluminum Foil Tape for Space Flight Use 546-WI-8072.1.73 -- Procedure for Application of S13GP/LO-1 Thermal Control Coating 546- WI-8072.1.74 -- Procedure for Application of Transfer Adhesives for Tape Fabrication and Heater Attachments</p>	<p>12 Month(s)</p>

MIST SOW TASK 129

Title: Thermal Coatings Flight Projects

<p>546-WI-8072.1.76 -- Procedure for Deposition of Aluminum Composite Thin Film                      Thermal;546-WI-8072.1.77 -- Procedure for Deposition of Dark Mirror Thin Film                      Thermal Control Coatings 546- WI-8072.1.78 -- Procedure for Deposition of Silver Composite Thin Film Thermal Control Coatings 546- WI-8072.1.79 -- Procedure for Deposition of Single Layer Thin Film Thermal Control Coatings, 546-WI- 8072.0.1                      - Procedure for Specification/Application of Electrically Dissipative White Silicate Thermal Control Coating,</p>	
---	--

Item	Description	Applicable Contract Function
3	<b>Program Thermal-Optical/Radiative Property Characterization of Thermal Control Coatings and Materials</b>	<b>Implementation Phase Services – Mechanical Systems Disciplines</b>

Performance Requirements	Delivery Schedule:
<p>Perform thermal-optical/radiative property measurements of flight, flight spares, ETU, and GSE, thermal control coatings and materials hardware and/or development and witness coupons for space application, utilizing the GSFC on-site coatings facilities and laboratories. Perform measurements in accordance with GSFC ISO document 546-WI-8072.1.61, entitled "Absorptance, Emittance, Reflectance, and Transmittance Measurement of Thermal Control Coatings" and calorimetric emittance evaluations and IR reflectance measurements, BRDF, or other established optical procedures/test methods approved by the TM. Generate and submit thermal-optical/radiative property test report within seven (7) days after completion of measurements.</p>	12 Month(s)

Item	Description	Applicable Contract Function
4	<b>Program Space Environmental Testing of Thermal Coatings and Materials</b>	<b>Implementation Phase Services – Mechanical Systems Disciplines</b>

Performance Requirements	Delivery Schedule:
<p>Perform general maintenance to maintain upkeep of the GSFC on-site space environmental testing equipment and facilities (such as: vacuum chambers, instrumentation, solar simulators, etc.).</p>	12 Month(s)
<p>Perform space environmental testing of flight, flight spares, ETU, and/or GSE thermal control coatings and materials for flight missions, utilizing the GSFC on-site coatings facilities and laboratories including Code 545 run thermal vacuum chamber support or other approved, external testing facilities for optical, structural, or mechanical evaluation in a space environment. Space</p>	12 Month(s)

MIST SOW TASK 129

Title: Thermal Coatings Flight Projects

<p>environmental testing shall include but not be limited to solar wind facility exposure, UV exposure, ESD evaluations, thermal cycling, thermal shock, vacuum resistivity measurements, outgassing related measurements, effects on thermal optical properties, and bakeouts, thermal conductivity and chemical decomposition in the presence of space environmental components such as atomic oxygen, mechanical strength and wear resistance. Modify existing or construct new Code 546 facilities to meet program test requirements. Governing GSFC ISO documents: Guidelines for Selection, Application, Characterization and Testing of Thermal Coatings (546-PG-8700.2.1) and Requirements for Thermal Design, Analysis, and Development (545-PG-8700.2.1A). Generate and submit space environmental test report after completion of test.</p>	
--	--

Item	Description	Applicable Contract Function
5	Coatings Project Support	Implementation Phase Services – Mechanical Systems Disciplines

Performance Requirements		Delivery Schedule:
Attend and participate in project related meetings, on and offsite, as required.		12 Month(s)
Author any new (or revise any old) specifications, design reports, work instructions, QA documentation, or drawings pertaining to project thermal coatings or other hardware/documentation as directed by TM		12 Month(s)

Item	Description	Applicable Contract Function
6	Procurement	Implementation Phase Services – Mechanical Systems Disciplines

Performance Requirements		Delivery Schedule:
Procure thermal control coatings and associated materials, raw materials (e.g. substrates), solvents, processing by external vendors or equipment such as Z93P, Z93C55, and silver Teflon coatings to support development, qualification, testing, and project support efforts or as directed by the TM.		12 Month(s)

Item	Description	Applicable Contract Function
7	Travel/Training	Implementation Phase Services – Mechanical Systems Disciplines

Performance Requirements		Delivery Schedule:
Travel to other NASA centers and vendor locations to address thermal coatings activities and/or issues, as needed. Travel to		12 Month(s)

MIST SOW TASK 129

Title: Thermal Coatings Flight Projects

support major design reviews such as CDR or FRR for projects or as directed by TM.	
Attend any necessary training to complete project requirements or tasks in the thermal coatings area or as directed by TM	