

Fiscal Year:	FY 2015	Task Last Updated:	FY 12/22/2015
PI Name:	Olson, Sandra Ph.D.		
Project Title:	Fundamental Research on International Standard of Fire Safety in Space - Subteam 1: Study of Flammability of Fabric Materials		
Division Name:	Physical Sciences		
Program/Discipline:			
Program/Discipline--Element/Subdiscipline:	COMBUSTION SCIENCE--Combustion science		
Joint Agency Name:		TechPort:	No
Human Research Program Elements:	None		
Human Research Program Risks:	None		
Space Biology Element:	None		
Space Biology Cross-Element Discipline:	None		
Space Biology Special Category:	None		
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PI Organization Type:	NASA CENTER	Phone:	216-433-2859
Organization Name:	NASA Glenn Research Center		
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Zip Code:	44135	Congressional District:	9
Comments:			
Project Type:	FLIGHT,GROUND	Solicitation / Funding Source:	2012 Japanese Space Agency (JAXA) AO for Fundamental Research on an International Standard of Fire Safety in Space
Start Date:	07/01/2014	End Date:	06/30/2019
No. of Post Docs:		No. of PhD Degrees:	
No. of PhD Candidates:		No. of Master' Degrees:	
No. of Master's Candidates:		No. of Bachelor's Degrees:	
No. of Bachelor's Candidates:	1	Monitoring Center:	NASA GRC
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Flight Program:	ISS		
Flight Assignment:			
Key Personnel Changes/Previous PI:	Dr. Sandra Olson is U.S. Co-Investigator on Japan Aerospace Exploration Agency (JAXA)-sponsored project, "Flammability Limits At Reduced-g Experiment (FLARE)." JAXA PI is Prof. Osamu Fujita, Hokkaido University.		
COI Name (Institution):			
Grant/Contract No.:	Internal Project		
Performance Goal No.:			
Performance Goal Text:			

Task Description:	<p>The objective of the project is to develop a methodology to correlate material flammability limits in normal gravity and microgravity, which allows quantitative estimation of material flammability limit in microgravity based on the flammability data obtained on the ground. The project involves an international team including JAXA, NASA, ESA and universities in Japan, USA, and France. Dr. Olson is a U.S. Co-Investigator for the Japan Aerospace Exploration Agency (JAXA)-sponsored experiments to be conducted aboard the Japanese Experiment Module, Kibo.</p> <p>To establish global standards for fire safety in space, we seek to develop a fundamental understanding of how NASA's material flammability test, NASA-STD-6001.A Test 1, relates to the actual flammability of materials in micro and partial gravity.</p> <p>The investigation strategy is to perform extensive research via ground-based experiments, including 1g and parabolic flight tests, and via theoretical formulations. Flight experiments on orbit in International Space Station (ISS)/KIBO will be performed to verify the correlation. The flight experiments on orbit are expected in 2018 or later.</p> <p>By the end of the project, a new fire safety standard test method for screening spacecraft materials will be proposed that addresses the shortcomings of existing standard test method such as NASA STD 6001B.</p>
Rationale for HRP Directed Research:	
Research Impact/Earth Benefits:	<p>Studying materials flammability in space allows us to accurately control the flow field and thus elucidate the importance of a critical Damkohler number (flow time /reaction time) on flame extinction. The anticipated improved methodology should reduce time and cost for the spacecraft material screening. Investigation and results have Earth benefits for terrestrial fire safety.</p>
Task Progress:	<p>A workshop for the project was held January 2015 at NASA's White Sands Test Facility. A presentation was made to the international team discussing the Burning and Suppression of Solids -II (BASS-II) test results obtained in 2014. In addition, pressure effects on flammability limits were examined.</p> <p>This year, a summer student performed microgravity forced convection drop testing using cotton fabric sheets, and blowoff limits were obtained and compared with normal gravity buoyant blowoff limits at low oxygen. Limits are lower in microgravity, consistent with previous results. Testing to study blowoff of acrylic slabs has started.</p> <p>NASA and JAXA are discussing a collaboration that would utilize the BASS-II (Burning and Suppression of Solids) hardware in the ISS Microgravity Science Glovebox for FLARE's thick polymethylmethacrylate (PMMA) samples in microgravity.</p>
Bibliography Type:	Description: (Last Updated: 04/17/2024)
Abstracts for Journals and Proceedings	<p>Fujita O, Takahashi S, Torikai H, Olson S, Fernandez-Pello C, Legros G, Tsue M, Nakamura Y, Wakatsuki K, Beeson H, Hirsch D, Orilandi M, Rhor T, Sakurai N, Shimamura H, Kikuchi M, Hosogai A, Katsuta M, Nakamura Y. "Introduction of combustion research project 'FLARE' utilizing ISS/KIBO for fire safety standard in the next generation." 6th ISPS (International Symposium on Physical Sciences in Space), Kyoto, Japan, September 14-18, 2015. 6th ISPS (International Symposium on Physical Sciences in Space), Kyoto, Japan, September 14-18, 2015. http://www.jasma.info/isps-6_ITTW2015/, Sep-2015</p>
Abstracts for Journals and Proceedings	<p>Kikuchi M, Mizushima T, Fujita O, Takahashi S, Ito A, Torikai H, Nakamura Y, Olson SL. "Overview of 'Solid Combustion' Experiment in the Kibo on board the ISS." 6th ISPS (International Symposium on Physical Sciences in Space), Kyoto, Japan, September 14-18, 2015. 6th ISPS (International Symposium on Physical Sciences in Space), Kyoto, Japan, September 14-18, 2015. http://www.jasma.info/isps-6_ITTW2015/, Sep-2015</p>
Papers from Meeting Proceedings	<p>Kikuchi M, Fujita O, Takahashi S, Ito A, Torkiai H, Nakamura Y, Olson SL. "Overview of the 'Solid Combustion' Experiment in the Japanese Experiment Module 'Kibo' on the International Space Station." 45th International Conference on Environmental Systems, Bellevue, Washington, July 12-16, 2015. 45th International Conference on Environmental Systems, Bellevue, Washington, July 12-16, 2015. Paper number ICES-2015-213. , Jul-2015</p>