



Flammability Assessment of Materials for Exploration (FLAME)

WBS: 904211.04.02.20.16 (starts FY13)
 NRC Decadal Identifier: AP6, AP7, AP8

Glenn Research Center

FLAME Investigations:

Residence Time Driven Flame Spread

Subrata Bhattacharjee, San Diego State University

Narrow Channel Validation

Fletcher Miller, San Diego State University

Spacecraft Materials Microgravity Research on Flammability

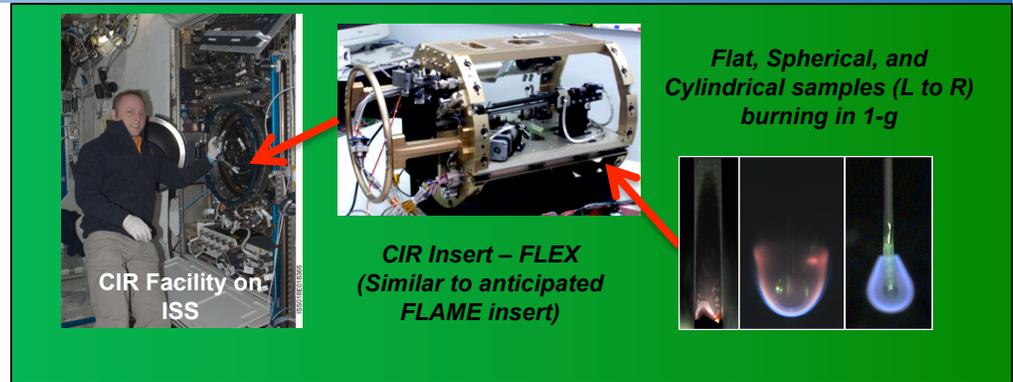
Sandra Olson, NASA Glenn Research Center

Growth and Extinction Limit

James T'ien, Case Western Reserve University

Material Ignition and Suppression Test

Carlos Fernandez-Pello, University of California, Berkeley



PS: Paul Ferkul, NCSER

PM: Mark Hickman, GRC

Engineering Team: GRC in-house team

Objective:

- ◆ To study and characterize ignition and flammability of solid spacecraft materials in practical geometries and realistic atmospheric conditions

Relevance/Impact:

- ◆ Improve EVA suit design
- ◆ Determine safer selection of cabin materials and validate NASA materials flammability selection 1-g test protocols for low-gravity fires
- ◆ Improve understanding of early fire growth behavior
- ◆ Validate material flammability numerical models
- ◆ Determine optimal suppression techniques for burning materials by diluents, flow reduction, and venting

Development Approach:

- ◆ Develop FLAME facility (CIR insert and avionics) to support multiple solid-material combustion and fire suppression studies; utilize Combustion Integrated Rack (CIR)
- ◆ Support multiple investigations using common infrastructure:
 - Common interfaces and flow control
 - Removable samples and igniters

ISS Resource Requirements

Accommodation (carrier)	CIR
Upmass (kg) (w/o packing factor)	250 kg
Volume (m ³) (w/o packing factor)	0.50 m ³
Power (kW) (peak)	0.75 kW
Crew Time (hrs) Crew Time (hrs)	8 hrs
- Initial configuration of CIR Rack - Change-outs during experiment	8 hrs
Autonomous Ops (hrs)	200 hrs
Launch/Increment	Inc. 55

Project Life Cycle Schedule

Milestones	Kickoff	SCR	RDR	PDR	CDR	VRR	Safety	SAR	Ship	Launch	Ops	Ops End	Report
Baseline	Oct 2012	May 2013	May 2014	Jun 2015	Sep 2016	Sep 2017	Dec 2017	Mar 2018	Apr 2018	Jul 2018	Aug 2018	Nov 2019	Dec 2020