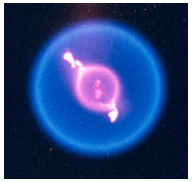
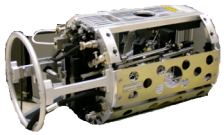
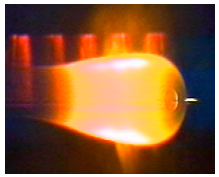
Flame Extinguishment Experiment-2 (FLEX-2)

Glenn Research Center

PI Team: Prof. Forman Williams, UCSD (lead)
Prof. Frederick Dryer, Princeton
Prof. Mun Choi, University of Connecticut
Prof. Benjamin Shaw, USC-Davis
Dr. Vedha Nayagam, NCSER
Prof. Thomas Avedisian, Cornell
Dr. Daniel Dietrich, NASA GRC

PS: Michael Hicks, NASA GRC
PM: Terence O'Malley, NASA GRC
Engineering Team: ZIN Technologies, Inc.

Left to Right: Image of Bi-component fuel droplet; color image of burning single fuel droplet; FLEX Chamber Insert Assembly Apparatus; image of burning droplet subjected to convective flows.

Objective:

- Modular apparatus designed for fundamental droplet combustion investigations
  - Investigate bi-component fuels
  - Examine the influence of sub-buoyant convective flows
  - Study practical fuels
  - Extend single droplet studies to binary arrays of droplets

Relevance/Impact:

- Extend single droplet combustion studies of pure fuels to consider idealized fuel mixtures and practical fuels
- Extend single droplet combustion studies to environments more relevant to engines (droplets in a flow-field and droplet-droplet interactions).
- Use experimental data to develop verified detailed and reduced-order models of droplet combustion.

Development Approach:

- PI unique fuel/gas containers built and launched to existing on-orbit Chamber Insert Assembly minimizing up-mass/volume, costs, and crew involvement

ISS Resource Requirements

Accommodation (carrier)	Combustion Integrated Rack
Upmass (kg) (w/o packing factor)	200 kg
Volume (m^3) (w/o packing factor)	0.08 m^3
Power (kw) (peak)	1.5 Kw
Crew Time (hrs) - Initial configuration of CIR Rack - Change-outs during experiment	 8.5 hrs 8.3 hrs
Autonomous Ops (hrs)	300hrs
Launch/Increment	19A/TBD

Project Life Cycle Schedule

Milestones	SCR	RDR/PDR	CDR	VRR	Safety (PH-3)	PSR	Ship	Launch	Ops	Return	Final Report
Actual/ Baseline	Nov 2007	Oct 2008	Dec 2008	Mar 2009	Apr 2009	Aug 2009	L-4	Feb 2010	Apr 2009	Jul 2010	Jul 2011
Documentation	Website: eRoom:				SRD: EDMP:			Project Plan: SEMP:			