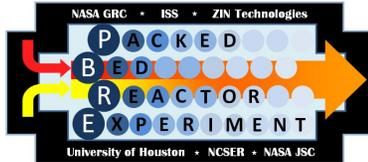




Packed Bed Reactor Experiment (PBRE)



PI: Dr. Brian Motil, NASA GRC
Co-Is: Prof. Vemuri Balakotaiah, University of Houston & Julie L Mitchell (JSC)
PS: Dr. Enrique Ramé, NCSER-NASA GRC
PM: Nang Pham, NASA, GRC
Engineering Team: ZIN Technologies, Inc.

Objectives:

- ◆ Investigate the role and effects of gravity on gas-liquid flow through porous media.
- ◆ Outcome will be the development of design and operational guidelines for gas-liquid Packed Bed Reactors in partial and microgravity conditions.

Relevance/Impact:

- ◆ Directly aligns with high priorities from the NRC Decadal survey on Biological and Physical Sciences and crosses over to other technologies.
 - ◆ AP-2: Provides a study of a critical multiphase flow component for life support systems.
 - ◆ TSES-6: Provides a fundamental study in porous media under microgravity conditions.
- ◆ Porous media are critical components in life support systems; thermal control devices; fuel cells; and biological and chemical reactors.

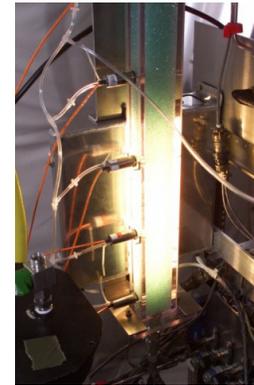
Development Approach:

- ◆ Completed extensive (but time-limited) low-G aircraft tests.
- ◆ Engineering model hardware and Proto-flight unit.
- ◆ Critical diagnostics and data collection with the capability to add/upgrade diagnostics.
- ◆ Develop on-orbit replaceable test section to extend experiment capabilities. Enables flexibility for future development of two-phase components/devices.

Project Life Cycle Schedule

Milestones	SCR	RDR	PDR	CDR	Fit Safety	FHA	Launch	Ops	Return	Final Report
PBRE	6/2005	2/2011	12/2011	1/2013	4/2014	6/2014	7/2014	Inc. 40-41	OPS + 4 m	Return +12m

Glenn Research Center



Packed Bed test in low-g Aircraft



Volatile Reactor Assembly (VRA) on STS 89

ISS Resource Requirements

Accommodation (carrier)	Microgravity Science Glovebox
Upmass (kg) (w/o packing factor)	107
Volume (m³) (w/o packing factor)	0.150
Power (kw) (peak)	0.75
Crew Time (hrs)	25 hours
Autonomous Ops (hrs)	200 hours
Launch/Increment	HTV/ATV/SPACEX/Inc 40