

## Summary of Results from NASA/EPSCoR Travel Support

1. Name, address, and telephone number of person traveling  
Chris Jenkins, ME Dept., 394-2406
2. When the travel took place  
Sunday – Tuesday, February 3 – 5, 2002
3. Where the person went, name of NASA Center or NASA Headquarters  
Jet Propulsion Laboratory, Pasadena, CA
4. Name(s) of the point(s) of contact at NASA  
Dr. Yoseph Bar-Cohen, Dr. Moktar Salama
5. Summary of Results

Dr. Jenkins currently has a Phase I (6 month) award from NASA that will expire in July of 2002. This award is to investigate the possibilities for incorporating active control elements, such as shape memory metals and piezoelectric polymers, into gossamer spacecraft. NASA JPL and U. Montana are co-investigators on this award.

A meeting was held February 3 – 5, 2002 to seek funds for a Phase II of the project. An outline of the Phase I work was developed and is provided on the next page.

The February meeting lead to an invitation to attend the Gossamer Apertures Workshop in Pasadena, California (schedule attached). The purpose of the meeting was to review Phase I progress and seek continued funding (Phase II) from interested agencies. Dr. Jenkins attended this workshop and made a presentation. Support of NASA EPSCoR is greatly appreciated.

Enabling Fabrication, Deployment, and Control of Precision Gossamer Apertures through  
Adaptive Gore/Seam Architectures

JPL Contract 1233915 (NAS 7-1407)  
Phase I Report

C.H. Jenkins (SDSM&T), Yoseph Bar-Cohen (JPL), Moktar Salama (JPL), Aleksandra  
Vinogradov (Montana State Univ.)

Executive Summary

1. Introduction
    - 1.1 Precision Gossamer Apertures
    - 1.2 PGA Requirements
    - 1.3 PGA Fabrication
    - 1.4 Scope of Work
  2. Control Architecture
    - 2.1 Control Issues for PGAs
    - 2.2 The Tool Box Concept
    - 2.3 PGA Tool Box
    - 2.4 Summary
  3. Candidate Active Materials
    - 3.1 Material Selection Procedure
    - 3.2 Assessment of Active Materials
    - 3.3 Short List of Candidate Active Materials for PGAs
    - 3.4 Sensors and Actuator Development
    - 3.5 Summary
  4. Active Seam Concept Development
    - 4.1 Concept Development Approach
    - 4.2 Classes of Active Seam Concepts
    - 4.3 Active Seam Concept Examples
    - 4.4 Summary
  5. Active Seam Modeling
    - 5.1 Structural Modeling for PGAs
    - 5.2 Control Modeling for PGAs
    - 5.3 Active Seam Model Examples
    - 5.4 Summary
  6. Conclusion
    - 6.1 Summary
    - 6.2 Technology Development Roadmap
    - 6.3 Future Work
  7. References
- Appendices
- A1 Selected Material Properties

**GOSSAMER APERTURE TECHNOLOGY WORKSHOP**  
**Old Pasadena Courtyard by Marriott**  
**180 N. Fair Oaks Ave., Pasadena, California**  
**May 15-16, 2002**

**PRELIMINARY AGENDA**

**15-May-02**

<b><u>Start</u></b>	<b><u>End</u></b>	<b><u>Name of Speaker</u></b>	<b><u>Name of Company/Institution</u></b>
7:30	8:00	Coffee/ Registration	
8:00	8:15	Introduction	
8:15	9:00	Hill, Lisa	TRW Space and Technology Division
9:00	9:45	McKinley, William	Raytheon Company
9:45	10:00	Break	
10:00	10:45	Hyde, Rod	Lawrence Livermore National Laboratory
10:45	11:30	Early, James	Lawrence Livermore National Laboratory
11:30	12:15	Dekany, Richard G.	California Institute of Technology
12:15	13:30	Lunch	
13:30	14:15	Barbee, Jr., Troy W.	Lawrence Livermore National Laboratory
14:15	15:00	Chen, Peter	NASA/Goddard Space Flight Center
15:00	15:45	Ealey, Mark	Xinetics Inc.
15:45	16:00	Break	
16:00	16:45	Marker, Dan	Air Force Research Laboratory
16:45	17:30	Jones, Ruth	NASA/Marshall Space Flight Center
19:30		Dinner	

**16-May-02**

<b><u>Start</u></b>	<b><u>End</u></b>	<b><u>Name of Speaker</u></b>	<b><u>Name of Company/Institution</u></b>
7:30	8:00	Continental Breakfast	
8:00	8:15	Introduction	
8:15	9:00	TBD	
9:00	9:45	Knowles, Timothy R.	Energy Science Laboratories, Inc.
9:45	10:00	Break	
10:00	10:45	Dooley, Jennifer	Jet Propulsion Laboratory
10:45	11:30	Knowles, Gareth	QorTek, Inc.
11:30	12:15	TBD	
12:15	13:30	Lunch	
13:30	14:15	Hill, Lisa	TRW Incorporated
14:15	15:00	TBD	
15:00	15:45	Angel, J. Roger P.	University of Arizona, Tucson
15:45	16:00	Break	
16:00	16:45	Jenkins, Chris	South Dakota School of Mines & Technology
16:45	17:30	Vining, Stephen D.	Cornerstone Research Group, Inc.