Fiscal Year:	FY 2008	**Task Last Updated:**	FY 06/19/2009
PI Name:	Hill, Andrea B.S.		
Project Title:	Lightweight, Wearable Metal Rubber-Textile Sensor for In Situ Lunar Autonomous Health Monitoring		
Division Name:	Human Research		
Program/Discipline:	HUMAN RESEARCH		
Program/Discipline--Element/Subdiscipline:	HUMAN RESEARCH--Operational and clinical research		
Joint Agency Name:		**TechPort:**	No
Human Research Program Elements:	(1) **ExMC**:Exploration Medical Capabilities		
Human Research Program Risks:	(1) **Medical Conditions**:Risk of Adverse Health Outcomes and Decrements in Performance Due to Medical Conditions that occur in Mission, as well as Long Term Health Outcomes Due to Mission Exposures		
Space Biology Element:	None		
Space Biology Cross-Element Discipline:	None		
Space Biology Special Category:	None		
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PI Web Page:			
City:	Blacksburg	**State:**	VA
Zip Code:	24060 - 0618	**Congressional District:**	9
Comments:			
Project Type:	GROUND	**Solicitation / Funding Source:**	SBIR Phase II
Start Date:	11/30/2007	**End Date:**	11/29/2009
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:		**Monitoring Center:**	NASA JSC
Contact Monitor:	Watkins, Sharmi1a	**Contact Phone:**	281.483.0395
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Flight Program:			
Flight Assignment:			
Key Personnel Changes/Previous PI:			
COI Name (Institution):			
Grant/Contract No.:	NNJ07JB18C		
Performance Goal No.:			
Performance Goal Text:			
	This NASA Phase II SBIR program would develop comfortable garments with multiple integrated sensor functions for the monitoring of astronauts during long duration space missions. During Phase I, NanoSonic demonstrated the feasibility of using its patented Metal RubberTM sheet and fabric materials as both sensor elements and highly flexible electrodes integrated into prototype instrumented garments. Heart rate and EKG data taken using the Metal RubberTM sensors are essentially identical to those obtained using standard biomedical instrumentation. The combined high electrical conductivity, low mechanical modulus, and environmental robustness of the Metal RubberTM materials make them a lightweight, stretchy and comfortable alternative to conventional metal wiring and cabling. During the proposed Phase II program, NanoSonic would work with a large-volume U.S. textile manufacturer, the sensor and electronics design group of a major aerospace company, and a biomedical sensor and devices laboratory of Food and Drug Administration. NanoSonic would improve the Metal RubberTM materials and methods for their integration as sensor		

Task Description:	and interconnect materials into instrumented garments, design, fabricate and evaluate the performance of sensor jerseys based on the results of Phase I tests, develop data acquisition electronics needed to interface to standard storage and communication modules, and investigate requirements for scaled-up manufacturing. POTENTIAL NASA COMMERCIAL APPLICATIONS: Commercial applications of NanoSonic's Metal RubberTM-based instrumented sensor garments similar to the ones developed through this NASA program are for emergency first responders (firemen, police, disaster relief personnel), the sports clothing industry, automated home and institutional health care, and the military and homeland security market. NanoSonic's patented Metal RubberTM materials and their unique combination of high electrical conductivity, low mass density, and low modulus will enable the penetration of this broad e-textile products area. Additional uses include as 1) electrical interconnects in truly flexible electronic displays, from large-area billboards to foldable computer screens, 2) large-area deployable photovoltaic fabrics for electrical power generation, 3) low-weight RF shielding and ground planes for cellphones, computers and other electronic instrumentation, 4) low weight, conformal RF phased array antennas for communication, asset tracking and surveillance, 5) air flow and water flow sensors for commercial aircraft and ship systems, and 6) electrical interconnects in next-generation prostheses.
Rationale for HRP Directed Research:	
Research Impact/Earth Benefits:	Metal RubberTM materials may be used as conformal and comfortable replacements for metal electrodes and wiring used in physiological sensor networks to monitor the status and performance of astronauts during long duration space missions. Due to its high conductivity and low mass density, it also may be used as a flexible, low weight alternative to conventional copper in instrumentation wiring onboard spacecraft. Electrically conductive, mechanically flexible, and ultralightweight Metal RubberTM fabrics may be used as part of large area RF antennas, space-based radar and photovoltaic arrays that are foldable and stowable for launch, then deployable in space. Additional aerospace uses include as ultralow-weight RF/EMI shielding and ground planes for spacecraft and aircraft, as highly flexible conductive fairings and electrical interconnects in next generation morphing air vehicles that change their shape to optimize flight conditions, and as conformal "sensor skins" for the unobtrusive measurement of aircraft skin friction and pressure.
Task Progress:	New project for FY2008. Reporting not required for this SBIR Phase 2 project.
Bibliography Type:	Description: (Last Updated:)